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PROFESSOR KNIGHT AND THE "PERIOD OF PRODUCTION"

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University of Buffalo

THE past few years have been prolific of contributions about "capital and the period of production."[1] Any increase in the output of such contributions certainly takes place under increasing cost (because it is necessary for the writer to study all his predecessors' products), and, probably, under decreasing return. Nevertheless, there seems to be good reason for submit-

[1] Frank H. Knight, "Capitalistic Production, Time, and the Rate of Return," *Economic Essays in Honour of Gustav Cassel* (London, 1933); "Capital, Time, and the Interest Rate," *Economica*, August, 1934; "Professor Hayek and the Theory of Investment," *Economic Journal*, March, 1935; F. A. von Hayek, "Capital and Industrial Fluctuations," *Econometrica*, April, 1934; "On the Relationship between Investment and Output," *Economic Journal*, June, 1934; Martin Hill, "The Period of Production and Industrial Fluctuations," *ibid.*, December, 1933; C. H. P. Gifford, "The Concept of the Length of the Period of Production," *ibid.*; "The Period of Production under Continuous Input and Point Output in an Unprogressive Community," *Econometrica*, April, 1935; J. Marschak, "A Note on the Period of Production," *Economic Journal*, March, 1934; K. E. Boulding, "The Application of the Pure Theory of Population Change to the Theory of Capital," *Quarterly Journal of Economics*, August, 1934; Wassily Leontief, "Interest on Capital and Distribution: A Problem in the Theory of Marginal Productivity," *Quarterly Journal of Economics*, November, 1934; R. F. Fowler, *The Depreciation of Capital, Analytically Considered* (London, 1934); Erich Schiff, *Kapitalbildung und Kapitalaufzehrung im Konjunkturverlauf* (Vienna, 1933); Richard von Strigl, "Lohnfonds und Geldkapital," *Zeitschrift für Nationalökonomie*, January, 1934; *Kapital und Produktion* (Vienna, 1934); Walter Eucken, *Kapitaltheoretische Untersuchungen* (Jena, 1934); Karl H. Stephans,

ting another unit of product. In a series of ingenious articles[2] Professor Knight has proposed to discard as worthless some tools of economic analysis which I consider indispensable for successful handling of certain problems. The tools he wants to scrap are those concepts which have been used in capital theory under different names, such as "length of the production process," "roundaboutness of production," "period of waiting," "period of production," "period of investment," "time structure of production," "period of maturing," and similar terms. Professor Knight's opinion has great weight with every serious student of economics; if the disputed concepts are to be rehabilitated, Professor Knight's criticism must be answered. This will be attempted here, partly with explicit reference to the contentions of Professor Knight, partly by way of general discussion of the concepts and the problems involved. An effort will be made, upon this occasion, to clear up a number of obscurities and ambiguities connected with the theory of capital "promulgated by Böhm-Bawerk and his followers and generally accepted and taught in the past generation."[3]

I. IS CAPITAL PERPETUAL?

1. *Stationary, growing, or retrograde economy.*—The usefulness, or even necessity, for economic theory of the conception of a "stationary economy" cannot be seriously questioned. This concep-

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"Zur neueren Kapitaltheorie," *Weltwirtschaftliches Archiv*, January, 1935. The following articles come to my attention too late to be taken account of in the present analysis: Howard S. Ellis, "Die Bedeutung der Produktionsperiode für die Krisentheorie," *Zeitschrift für Nationalökonomie*, June, 1935; M. Joseph and K. Bode, "Bemerkungen zur Kapital- und Zinstheorie," *Zeitschrift für Nationalökonomie*, June, 1935; Oskar Morgenstern, "Zur Theorie der Produktionsperiode," *Zeitschrift für Nationalökonomie*, June, 1935; Richard von Strigl, "Zeit und Produktion," *Zeitschrift für Nationalökonomie*, June, 1935; Ragnar Nurkse, "The Schematic Representation of the Structure of Production," *Review of Economic Studies*, June, 1935. Besides the published material, manuscripts by F. A. von Hayek and an unpublished discussion in correspondence between G. von Haberler, F. A. von Hayek, J. Marschak, L. von Mises, and myself were drawn upon in writing this article.

[2] Besides the three articles by Professor Knight listed in the last footnote, see also his paper, "The Ricardian Theory of Production and Distribution," in the *Canadian Journal of Economics and Political Science*, February, 1935.

[3] Knight, *Economic Journal*, XLV (March, 1935), 79.

tion is inseparably bound up with the application of the method of variation in economics. One cannot arrive at any conclusion about the effects of any change if the "other" (independent) things (or conditions) are not set "invariant" or assumed to be unchanged. Thus, in a discussion of the effects of a certain "shift in demand," or of a changed supply of money, or of better crops, or of any other "substantive" change, one conveniently starts out with the assumption that the supply of "capital" does not change independently at the same time. One of the greatest difficulties in our theory, the problem of "maintaining capital intact," is, of course, evaded by assuming a stationary economy, but this can be considered permissible for certain problems. There is, however, one problem in the discussion of which the simple assumption of the stationary state is not permissible, namely, the problem of the capital stock or capital structure itself. To assume perfect maintenance of capital where one should discuss the conditions of such maintenance is a case of begging the question, or, at least, of avoiding the problem which is to be solved.

A statement such as "all capital is inherently perpetual"[4] is of doubtful value. If it is limited to the case of an economy which is assumed to maintain, or to add to, its capital, it is but a repetition of the assumption. If it is stated as a fact, it is wrong. If we define a stationary economy as one which (perhaps among other things) maintains its capital, and if we call capital "perpetual" when it is (at least) maintained, then the assertion that for a stationary economy all capital is inherently perpetual obviously means no more than that an economy which maintains its capital maintains its capital. Much more important is the question whether economies always maintain their capital, and under what conditions they do so.

Professor Knight thinks he is warranted in asserting "the *fact* of perpetuity."[5] He adds, however: "Unless society as a whole becomes decadent with respect to its stock of capital, no increment of capital viewed as a quantity ever is disinvested."[6] This "un-

[4] Knight, *Economica*, August, 1934, p. 264.

[5] *Canadian Journal*, February, 1935, p. 15 (italics are his).

[6] *Ibid.*, p. 15.

less" qualification reduces the "fact" again to tautology. (Unless society acts differently it acts in the asserted way.) In other places the "fact of perpetuity" is stated in a less safe—because less tautological—formulation.[7] There was and is always the choice between maintaining, increasing, or consuming capital. And past and "present" experience tells us that the decision in favor of consumption of capital is far from being impossible or improbable.[8] Capital is not necessarily perpetual.

2. *Individual disinvestment, social disinvestment.*—In a "capitalistic society," in which property is owned privately, the process of capital disinvestment is the result of action or inaction of individuals, under the influence of their personal preferences or of certain institutional forces or of state interference.[9] It must be clear that at any moment of time the alternatives are open to change in either direction, or to leave unchanged the relation between the current stream of consumption income and the future stream of consumption income, the latter partly being represented in the existing capital (which is the "capitalized" value of future income). The conditions under which such alternatives can be realized are dependent on the given production structure of the whole community and on the simultaneous choices on the part of the other individuals within the community. Dissaving and disinvesting by one individual can be offset by saving and investing by another individual, in which case the individual disinvestment does not become social disinvestment. That "in a stationary or growing society disinvestment by an individual owner in no wise involves actual reconversion of 'capital' into income"[10] is again nothing but a tautology. It is just the relation of the total amounts of capital individually disinvested to the total amounts

[7] "Capital is perpetual in so far as economic principles obtain and economic reasoning is applicable" (*Economica*, August, 1934, p. 277); or, "in a society which is not planning for the end of all things, all property income is perpetual" (*ibid.*, p. 268). Neither of the two contentions seems to be correct. Economic reasoning can be perfectly well applied to an economy which consumes parts of its capital. Nor is it necessary that such a society plan for "the end of the world."

[8] For an illustration of a case of capital consumption see my article, "The Consumption of Capital in Austria," *Review of Economic Statistics*, January, 1935.

[9] *Ibid.*

[10] Knight, *Economica*, August, 1934, p. 273.

of capital individually invested at any moment of time which makes society stationary, growing, or retrograde.

The problem of social "net" investment or "net" disinvestment is important, and its discussion calls for consideration of certain "time relations." Since investment is a conversion of present income into future income (i.e., capital) by abstaining "for a certain interval" from a "strip" of the present consumption stream; and since disinvestment is a "reconversion of 'capital,' i.e., of [future] income, into income for a short period at a correspondingly higher time rate,"[11] it is an economic problem of major importance to find out about the time distance between those present and future incomes, about the mentioned "interval," and about the mentioned "period." These "periods" are important for the main problems of capital theory which is the theory of actual or potential changes in the quantity relationship between present and future services—or, in other words, the theory of distribution of services over time.

3. *Are production and consumption simultaneous?*—The assertion that all capital (in terms of value of anticipated future income) is always maintained and, therefore, "perpetual" was made to support the view that the notion of a period between production and consumption is meaningless. The assertion to the contrary that capital need not, and, in fact, is not, always maintained ought to support the view that the notion of the mentioned period has meaning and significance. Professor Knight is prepared to admit that "the notion of a lapse of time between production and consumption has practical meaning where society has to meet *unanticipated* changes in conditions."[12] Apart from the theoretical and practical importance of unanticipated changes in conditions —it is not far from correct to call reality a continuous series of unanticipated changes—it is clear to me and many others that the "potentiality" of change is always present and that the choice between alternatives (only one of which is to abstain from changing, and hence to repeat, former choices) is a category in economics.

For the picture of a stationary state, from which change is ab-

[11] *Ibid.* In the original, "perpetual" income stands for "future" income.

[12] *Ibid.*, p. 276. Economica A. 1934

sent, simultaneity of production and consumption can be a useful fiction. With the aid of a "cross-section" view of production and with the element of time abstracted, certain relations in the economic system become more readily perceptible. Hence, propositions such as "production and consumption are simultaneous,"[13] or "the production period for consumed services . . . . is zero,"[14] are useful and admissible (fictitious) assumptions for the discussion of certain problems of the stationary economy. But the "as if" character of such heuristic suppositions must never be forgotten. And for discussion of problems other than those of an absolutely stationary state, especially of problems of capital, of investment,[15] of changes in demand, and similar ones, the assumption of "simultaneity of production and consumption" is misleading and inadmissible and has to be dropped. Only for problems of the first type may maintenance of capital, including replacement of particular items of "plant," be conceived as a part of the production of the output consumed at the same time.[16] But any theory of economic change and any theory of capital has to regard the time element as its integrant part. The production of a definite quantity of output can be done with or without full maintenance of the instruments necessary for its production. Therefore, the output of consumable services is not dependent upon the simultaneous input of productive services used for maintenance or replacement of plant; the productive services used for maintenance or replacement of plant are not a part of the production of services consumable at the same time, but at later moments of time; there is a time interval between the input of services and the "dependent" output of services,[17] and this

[13] *Ibid.*, p. 275.

[14] Knight, *Economic Journal*, March, 1935, p. 88.

[15] Note the following concession of Professor Knight's: "In the act of growth, 'waiting' can be said to be involved, both during the interval of construction itself and at least for such time thereafter as is required for the new capital to yield a total of consumption equal to that which was sacrificed in creating it" (*Economic Essays in Honour of Gustav Cassel*, p. 339).

[16] Knight, *Economic Journal*, March, 1935, pp. 84–85.

[17] It is absolutely incomprehensible to me that Professor Knight, as one of the rare economists who understands, holds, and teaches "the only theory which makes

interval may conveniently be called "period of production" or "period of investment."

4. *Capitalization of perpetual or of time-limited income.*—That the cost of production of any "capital good" is equal to its capitalized future return is a well-established condition of equilibrium. How the rate of interest enters into both sides of the equation was shown by Professor Knight with utmost clarity.[18] On the cost-of-production side of the equation interest is calculated (as "carrying charges") on the services successively invested during the "period of construction." On the capitalized-income side of the equation interest is calculated on the series of future yields to reduce it to the "present value." There are two methods of capitalization. The one simply capitalizes the series of gross returns expected during the service life of the capital good; the other method reduces first the time-limited series of gross returns by way of deducting all maintenance and replacement costs to a perpetual series of net returns and then capitalizes this perpetual series. However, "it happens to be somewhat simpler algebraically not to make this conversion formally, but to express the present worth of the time-limited income stream directly."[19]

In practical life capitalization of a limited series of returns is more usual than that of an infinite series, not only on account of mathematical simplicity but on account of the character of the capital items. Cases of perpetual annuities are rare. The valuation of plants, buildings, machines, etc., fixes attention upon a limited service life of the particular object valued. The valuation of bonds takes into account the maturity of all payments for interest as well as for the "principal." How complicated capitalization would be if the "perpetual income method" were to be used

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sense at all" (*ibid.*, p. 82), namely, the theory which explains "cost" as "displaced alternative," should not see this point. Consumable services available at different, more or less distant, future points of time are the "alternative" uses of the productive services available at any one moment of time. The simultaneous output is not—or only for an infinitesimally small part—among the alternatives.

[18] *Economica*, August, 1934, pp. 265–66; *Canadian Journal*, February, 1935, pp. 14–15.

[19] *Canadian Journal*, February, 1935, p. 14.

is easily seen when one again faces the fact that we live in a changing world. With "bygones forever bygones," the cost of production of existing items does not count for their valuation. There is now no "actual" capital value to start with, and replacement quotas could be known only with respect to the "historical value" but not to the "present value." With replacement quotas unknown there is no way of knowing the net yield. There is, then, nothing but a limited series of gross returns, and this is what is capitalized. Only afterward, when the calculation of the present value has been finished, could a "perpetual-income series" be constructed. Take the case of finding the capital value of a plant in an industry which is experiencing bad times. Maintenance of the plant[20] would mean negative net returns. But this does not at all mean that the value of the plant is negative. If there are positive gross returns, for a limited period of time, of course, there will be a positive capital value.

These few illustrations, I hope, make it sufficiently clear that practice does not make things obscure by supposing "perpetuity" of income or of capital. Theory should not do so either.

II. THE LENGTH OF THE PRODUCTION PERIOD

5. *The concept and its name.*—It has been stated, in the preceding discussion, that the time interval between the input of (productive) services and the "dependent" output of (consumable) services is significant for a number of economic problems. This time interval was called, by Böhm-Bawerk, the "degree of roundaboutness of production," or the "length of the production process," or the "period of production." The last two names, which Böhm and most of his followers continued to use in spite of the protests of Wicksell and others, contributed much to the confusion about the concept. The words convey a meaning which is not that of the concept: one thinks of the duration of the process of production proper, which is by some writers called "*direct* production period" (as distinguished from the duration of *indirect*

[20] It is fair to note that Professor Knight does not assume maintenance of particular capital items, but only of their actual value.

production) and by others "duration of the technical process" (as distinguished from direct and indirect *durability*).

A number of different sorts of durations or periods are embraced by Böhm's concept. If one had to find out what time would elapse from the moments at which certain services, say a number of labor hours employed in a machine shop, are being "put in" (invested) until the moments at which the dependent consumable services mature, the following durations would have to be considered: (*a*) the duration of producing the machine; (*b*) the duration of the production of the goods made with the help of the machine, and the duration of the production of the succeeding products made with the help of the mentioned goods, etc., all the way up to the final stage; (*c*) the durability of the machine, (*d*) the durability of the goods made with the help of the machine, and the durability of the products made with the help of the mentioned goods, etc., all the way up to the final services which are to be had. All these four sorts of durations have to be considered, but this does not at all mean that they have to be added. We shall speak about this presently. First it should frankly be stated that all objections to "period of production" as a name for that composite period meant by Böhm's concept are fully justified. Terminological magnanimity may tolerantly pass over the misnomer and continue to use it. But it certainly would be better to return, according to Professor Hayek's recent suggestion, to Jevons' and Wicksell's practice and speak of the "period of investment."[21]

6. *Absolute versus average length of the period.*—We warned against the fallacy of adding up all the "durations" of direct and indirect production and direct and indirect service life. It is easily understood that, under the technique of our times, such adding-up would arrive at an infinite period. Production is continuous—not only in the sense that at any moment of time "past services" are consumed and "future services" provided, but also in the

[21] Professor Eucken, in his *Kapitaltheoretische Untersuchungen*, coined the word *Ausreifungszeit*, i.e., "period of maturing." The choice of the name is, however, a matter of indifference compared with the importance of using the concept in an appropriate way. In the rest of the discussion the terms period of production and period of investment will be used interchangeably.

sense that durable instruments constructed in the past are used in the construction of durable instruments for future use. In this sense "the production period has no beginning and no end unless .... the date of the end of the world is known from the beginning."[22] Or, more correctly, only "the beginning and end of social economic life"[23] would mark the boundaries of that "period of production." And "it would never be possible to give any sensible answer to the question" when (to repeat Professor Knight's examples) the production of a certain glass of milk "began," or when the process of consuming the result of productive activity such as feeding a cow would "end."[24]

Has the *naïveté* or absurdity of the whole conception employed by Böhm-Bawerk now been revealed and sufficiently ridiculed? Let Böhm himself give the answer:

> Where I have spoken [above] of extension or prolongation of the roundabout process of production .... I must be understood in the sense [just] explained. The length or the shortness of the process, its extension or its curtailment, is not measured by the absolute duration of the period that lies between the expenditure of the first atom of labor and the last—otherwise the cracking of nuts with a hammer which might chance to be made of iron brought from a mine opened by the Romans would perhaps be the most "capitalistic" kind of production.[25]

Can one warn more expressly against the pitfall of taking the absolute period of production for the significant time interval? Böhm's concept was "the *average* period which lies between the successive expenditure in labor and uses of land and the obtaining of the final good."[26] The fact that some of the services reach into the indefinite future represents no difficulty for averaging the time dimensions. The bulk of the services mature in the near future and fewer in the more distant future, while the number of services maturing after infinite intervals is infinitesimally small.

In the well-known diagrams used by Jevons, Böhm, Hayek, and others—be it the ring diagram or the triangle diagram—the ab-

[22] Knight, *Economic Essays in Honour of Gustav Cassel*, p. 338.

[23] Knight, *Economica*, August, 1934, p. 275.

[24] *Ibid.*

[25] *The Positive Theory of Capital* (London, 1891), p. 90.

[26] *Ibid.* On the limitation to "labor" and "land," see below (sec. 14).

solute period of investment is assumed to be finite. This assumption would imply that there is one stage of production at which no tools and no instruments, but only the "original" services of land and labor, are employed. If to this entirely unrealistic assumption another one is added, namely, that the further input of "original" services takes place continuously at a uniform rate during the whole absolute period, then the average period of investment is half of the absolute.[27] The fiction of a finite absolute production period facilitates the exposition of certain relations but has to be dropped in the course of any further analysis. It is to be regretted that it has contributed to so many serious misunderstandings.

7. *Average period versus shape of the investment function.*—It might be well to familiarize ourselves somewhat further with the meaning of the average investment period, before we deal with a more complicated concept. Imagine for a moment that labor is the only kind of productive service and is homogeneous in quality. At any point of time all labor being invested at that instant is planned and expected to yield (to contribute to) consumable services at some future time. (Most of the input of labor of that instant is planned to be combined with additional labor which is to be invested at successive moments of time, and the final product will be, of course, a joint product of services invested at different points of time.) The labor invested today includes a certain amount which is to yield services consumable today, another amount which is to yield services consumable tomorrow, another the day after tomorrow, etc. Smaller amounts of labor invested today in some durable instrument of production will get very high "futurity indices" and an infinitesimal amount will get the futurity-index (or time-dimension) infinity. The average of all these indices, weighted according to the respective number of labor units, is the average period of investment.

[27] There is another concept which is sometimes confused with the average period of production, namely, the "average period of waiting," which is dependent, apart from the other time dimensions, upon whether production is arranged in simultaneously operating stages, i.e., upon whether output becomes available continuously or with intervals (e.g., crop output). See Böhm-Bawerk, *op. cit.*, pp. 327–28. The subsistence-fund theory refers directly to the "waiting period" and through it to the production period.

The "average period" as an expression for the distribution of services over time is serviceable only for certain purposes and only if this distribution scheme is rather simple. Imagine changing our plans, one day, simply by switching some units of labor to activities of later maturing yield. This switching may be expressed by saying that the average period of investment has been lengthened. But take another type of rearrangement, where some productive services are transferred from uses with quick maturity to uses with later maturity, but also some other productive services are transferred from uses with very late maturity to uses with medium-high futurity indices.[28] Such a change in the distribution of services over time would be possible without any change in the "average." This shows that not only the average of all time dimensions but also their dispersion may be significant. The "shape of the investment function" would tell what the simple "average investment period" conceals.

There are other reasons for not accepting the "average period of investment" as an adequate expression for, or measure of, the time structure of investment. Professor Hayek reminds us that the time intervals of waiting are, as to their economic significance, not homogeneous magnitudes which can be averaged.[29] Another argument advanced by Professor Hayek is concerned with the relationship between the interest rate and the investment function. The investment function, he explains, is rather complicated because of the "investment in compound interest"; this makes it not only impracticable to represent it in terms of averages but also to represent it in one-dimensional diagrams.[30] But this need not

[28] Changes of this type play a rôle in the business-cycle analysis of Professor Strigl (see *Kapital und Produktion* [Vienna, 1934], pp. 192–95).

[29] Hayek, unpublished manuscript.

[30] Hayek, "On the Relationship between Investment and Output," *Economic Journal*, June, 1934, p. 217. Three principal kinds of investment functions should be distinguished. The most usual may be called the "cumulative investment function." It represents either the cumulative amount of services applied at any successive moment of time in the course of the process of producing the output finished at one moment of time or the cumulative amount of services (simultaneously) applied at successive stages (i.e., consumption distances) of production up to the final output. A second kind may be called the "service-application function," since it shows the application of services in the process of production at successive moments of

frighten us too much. For most analytical purposes it will be quite sufficient to bear in mind that one cannot do everything with the average period without reference to the "shape of the investment function." But one can use it for first approximations to the solution of a number of important problems in the theory of capital and, I believe, in the theory of fluctuations.

8. *"Time" per unit of output versus "time" per unit of input.*— Two more sources of confusion must be disclosed and blocked. The one originated from a careless use of the word "time" to measure both the input of productive services (labor hours, service hours, land-use years) and the interval elapsing between input and the dependent final output. The second confusion came from erroneous averaging of those intervals per unit of output rather than per unit of input.

A simple numerical example (Table I) will illustrate clearly this type of error. Under unchanged technical knowledge, unchanged length of the working day, homogeneous labor, and homogeneous product, three cases will be considered in one of which the average period of investment will be lengthened (Case II), and in another the number of workers will be increased (Case III). Both variations (support of workers through longer period, and support of more workers through unchanged period, respectively) are assumed to be rendered possible through the provisions of more "subsistence fund."

Comparing Case I with Case II we see that the increase in

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time or successive stages of production. It is simply the slope (first derivative) of the cumulative investment function. The third kind, investment function proper, represents the distribution of all productive services rendered at a moment (small interval) of time among the uses of different consumption distances. It is but the inverted service-application function. Services applied to the earliest stage of production are, for the inverted figure, services applied for uses of greatest consumption distance. Services applied to latest stages of production are, for the inverted figure, services applied for uses of smallest consumption distances.

Professor Hayek drew a figure of the cumulative investment function and inverted it instead of its first derivative (*ibid.*, p. 210). Unfortunately, he interpreted the inverted figure as though it were the inverted service-application function. I am afraid that this error may have confused some readers. It should be noted that for changing conditions only the third sort of investment function is significant, though it is for certain purposes too sensitive with regard to discontinuous outputs.

length of the investment period leads to a less than proportional increase in output per labor hour. Now "critics" would say: "The production of one unit of output needs in Case II not more but less time than in Case I; namely, one-eleventh rather than one-tenth hour." The "time" of which they speak obviously means "labor," which is, of course, measured by time. The saving of "time" in this sense, i.e., the saving of labor services per unit of

TABLE I

	Case I	Case II (Labor Constant; Subsistence Fund Increased)	Case III (Labor Increased; Subsistence Fund Increased Proportionately)
Number of workers	100 men	100 men	120 men
Length of working day	10 hours	10 hours	10 hours
Average period of investment*	100 days	120 days	100 days
Labor input during this period	100,000 hours	120,000 hours	120,000 hours
Output during this period	1,000,000 units	1,320,000 units†	1,200,000 units
Labor input per day	1,000 hours	1,000 hours	1,200 hours
Output per day	10,000 units	11,000 units	12,000 units
Output per hour	1,000 units	1,100 units	1,200 units
Output per man hour (i.e., per unit of labor input)	10 units	11 units	10 units
Labor input per unit of output	$\frac{1}{10}$ hour	$\frac{1}{11}$ hour	$\frac{1}{10}$ hour

* The length of the investment period is assumed (not calculated from the other data). In Case II production is assumed to be more roundabout through the use of an intermediate tool which is entirely used up at the end of the 120 days. In Case III the same production method as in Case I is applied.

† This figure does not show increasing returns. It has to be more than in proportion to the increase of the average period of investment, i.e., 100:120, even to show decreasing returns. A figure of less than 1,200,000 units of output over the longer period would imply negative return to the added 20 days of investment. The total "waiting" is increased not simply by the lapse of time, but by time multiplied by the amount invested at any moment.

output, is the very objective of the lengthening of the investment period. The increment in product per labor hour constitutes the "productivity" of the extension of the investment period. The measurement of the amount of services invested in terms of time units must not be confused with the "time dimension" of the investment in the sense of its "time distance" from consumption.

But other "critics" would say: "Not only 'labor time' but also 'waiting time' per unit of output is less in Case II. In Case I we had to wait 100 days for 1,000,000 units of output; in Case II we have to wait 120 days for 1,320,000 units of output. Therefore,

average unit waiting time in Case I was one-ten-thousandth of a day; in Case II only one-eleven-thousandth of a day." This "waiting time per unit of output" is an embarrassing confusion. The 100 and 120 days, respectively, were already averages per unit of labor input, and there is absolutely no sense in dividing these figures by the amount of output. That it does not make sense is shown by a comparison between Cases I and III, both of which include an equal and unchanged production period. In Case III, 1,200,000 units are produced in 100 days. The absolute increase in output, due to the increase in men and the proportional increase in "subsistence fund," with the unchanged period of production would give a shorter "period of production per unit of output"[31] if this had any meaning. The production period is the average number of waiting hours applied to the labor hour; it is an average period only in terms of input (of services other than waiting). If the average investment period is to be set in relation to output, not the absolute amount of output but average output per unit of labor input is the adequate magnitude for comparison. An "average period in terms of total output" is meaningless.

9. *Construction period and utilization period.*—The misconceptions dealt with in the last sections are of very old acquaintance—Böhm-Bawerk himself was concerned with them in his "excursus."[32] A novel method of arriving at erroneous averages is applied by Professor Knight. He divides the sum of the periods of construction and utilization of different plants by the number or value of plants, and states then, correctly of course, that an addition to the existing equipment may well "involve an increase in

[31] The erroneous reasoning would be: "We have to wait 100 days for 1,200,000 units; average waiting time per unit of output is therefore one-twelve-thousandth of a day; this is less than the one-ten-thousandth in Case 1." It should be noted that in Case III more workers are employed in an unchanged production period, hence with a constant amount of "capital per head." This will be discussed later. It was on purpose that I assumed here the subsistence fund to be increased proportionately with the number of men at work, in order to avoid the complications of shortening the investment period necessary when less "capital per head" is available. This is also reserved for later discussion.

[32] See the third or fourth German edition of his *Positive Theorie des Kapitales.*

the capital, while *shortening* the average cycle."[33] He thinks of the replacement cycle of durable capital goods. This cycle consists of the period of construction of the equipment plus its durability. Imagine that there are three plants, one with a period of construction plus utilization of 5 years, another with such a period of 10 years, and a third with one of 15 years. Now, additional investment is made by creating a fourth plant with a 6-year period. (The productive services engaged in constructing and maintaining the fourth plant must have been employed formerly in other lines, say, in farming.) In the case of three plants Professor Knight's "average period" was 10 years (5+10+15 divided by 3), while in the case of four plants (more capital!) the "average period" is only 9 years (5+6+10+15 divided by 4). This "average per unit of plant," or, weighted with the value of plant, the "average per capital invested," he erroneously took as the average investment period and, of course, found that it did not bear the well-known relation to the quantity of capital, viz., that it failed to increase with the increase in investment. The "average period of construction" plus the "average period of utilization" (both averages per unit of plant value) is by no means equal to the average period of investment (which is an average per unit of productive service inclusive of those not engaged in the construction and replacement of durable goods).

Making goods which need a longer time of construction and making goods which last longer are perhaps only "two details which are of the same significance as any of an infinity of other details," and are certainly only two "among an infinite number"[34] of ways of investing more capital. But "the two together" do certainly not constitute, as Professor Knight so strongly believes,[35] Böhm-Bawerk's period of production. It is inexplicable how Professor Knight could arrive at such an extremely narrow definition of the production period. Böhm-Bawerk, who is now accused of "simply selecting these two details" and giving them "the false

[33] *Economic Journal*, March, 1935, p. 81 (italics are his).

[34] Knight, *Economica*, August, 1934, p. 268.

[35] *Ibid.*, pp. 268–70; *Economic Journal*, March, 1935, pp. 78, 81, 88, etc.

designation of length of the production process,"[36] wrote the following sentence about investment in increased durability:

> It represents but one of the many special forms of using labor for obtaining consumption goods by those roundabout processes which make it possible to get out more goods per unit of original factors of production but at points of time which on the average are more remote from the time of input of those factors.[37]

Hence there is no conflict of opinion between the critic and the criticized that "average durability of the goods" and, similarly, the "average construction period for such goods"[38] need not be increased if total investment increases.

10. *Average durability.*—In spite of the fact that it was quite foreign to the theorists who reason in terms of investment periods to identify this concept with average construction periods plus average durability of goods, it should be noted that the relationship between "average durability" and "capital supply" is much closer than Professor Knight seems to allow for. An increase in "capital supply," in a money-enterprise economy, leads to increased investment through a lower rate of interest. (The supply of other services is assumed to be unchanged.) A reduction of the interest rate decreases construction cost as far as "carrying charges" are concerned and increases the present value of durable goods because of the lower discount of future returns. The latter phenomenon is of major significance. The increase in present value is the stronger the more durable the instruments are.

Let us compare this effect on the value of instruments of different durability. An instrument with a service life of one year and a gross return of $1,000 would have a present value of $940, if the interest rate is 6 per cent, and a present value of $970 if the interest rate is only 3 per cent. An instrument with a service life of two years and a gross return of $1,000 in each year would have under simple interest of 6 per cent a present value of (940+880=) $1,820, and under simple interest[39] of 3 per cent a present value of

[36] Knight, *Economica*, August, 1934, p. 268.

[37] *Op. cit.* (3d ed., 1909), p. 170; *ibid.* (4th ed., 1921), p. 127.

[38] Knight, *Economic Journal*, p. 78.

[39] A simple example was preferred here. Compound interest should be calculated for almost all practical (and theoretically important) cases.

(970+940=) $1,910. A fall of the interest rate from 6 to 3 per cent raises the value of the short-lived instrument from $940 to $970, i.e., by 3.2 per cent, while it raises the value of the long-lived instrument from $1,820 to $1,910, i.e., by 4.9 per cent. Cost of construction (aside from interest) being unchanged—the case is still stronger if the more durable instrument requires a longer time for construction and, hence, becomes now relatively cheaper in construction—it will be much more profitable to construct the more durable instrument.

The differences in the price increases of goods of different durability become the sharper the greater the expected service life is. Let the rate of interest drop only from 5 to 4 per cent and there results an increase in present value of a good with ten years' service life by about 5 per cent whereas the increase is more than 9 per cent for a good with twenty years' service life. (Compound interest was calculated here.)

There is, hence, a very strong presumption for the belief that increased supply of liquid capital leads to increased investment in durability, even in the sense of "average durability of goods," the concept emphasized by Professor Knight.

11. *"More durable" goods versus more "durable goods."*—In his criticism of the production period Professor Knight concentrates his forces against the alleged increase in the durability of goods. Again and again he asserts that increased investment need not involve increased durability and "therefore" need not involve increased "time between production and consumption,"[40] i.e., a longer investment period. The crux of the whole argument is the idea that making goods "more durable" is, but making more "durable goods" need not be, a lengthening of the investment period, according to Professor Knight's interpretation of the "Austrian" theory of capital.

Investment means, for the "Austrians" at least, using productive services for future consumable services. Increased investment means using the productive services on the average for consumable outputs in a more remote future. This lengthening of the period of maturing can be done in many ways, one of which is

[40] *Economica*, August, 1934, p. 269.

the making of goods and instruments of higher durability, another is the making of a greater amount of durable goods and instruments. If the primitive inhabitants of the famous isolated island, where fishing is the only line of production, and nets are the only type of durable instruments, abstain temporarily from some portions of consumption and add one more net to their stock, they certainly lengthen their investment period. (Labor is withdrawn from fishing and employed for making the net. Total labor supply remains constant, of course.) "Average durability" per unit of stock, per net, would remain equal. But even if they make the new net of lower durability, and decrease thereby the "average durability" of nets, the investment period would still be lengthened. Or if our good old Robinson Crusoe adds to his stock of tools, which last "on the average" one year, a new knife which lasts only two weeks, he still lengthens his production period. By refraining from direct consumptive use of some labor hours and using them for making the knife (and, later on, for maintaining or replacing the knife), he changes the average time distance between input and dependent output.

That, with a given amount of productive services employed, the making of a greater amount of durable goods per se would not involve any greater length of the investment period is a unique interpretation of the concept. The emphasis placed on this point by Professor Knight is striking. "More goods of the same kind," he says, "would mean no permanent change in either investment function or output function, as defined by Professor Hayek."[41] This should be contrasted with Professor Hayek's statement about the possibility of "changing the investment function for industry in general without changing it for any one industry."[42] The proportions *within* any one industry may be rigid and remain unchanged (the durability of their equipment, of course, too), but the proportions *between* industries may change. The investment function of society as a whole changes not only if goods are made "more or less durable" but also if more or less "durable goods" are made.

[41] *Economic Journal*, March, 1935, p. 78.

[42] "The Relationship between Investment and Output," *ibid.*, June, 1934, p. 224.

III. DIFFICULTIES AND COMPLICATIONS

12. *The view backward and the view forward.*—In the few places where we, thus far, had to define the production period we tried to avoid one dilemma which probably has not been seen clearly by Böhm and some of his immediate followers. The question how far into the future the output that depends on present activities is expected to reach, on the average, is different from the question how far back into the past reach, on the average, the activities on which the present output depends.[43] Under the assumption of a stationary economy in an unchanging world, the "historical" production period and the "anticipated" production period may be equal. But how are the two "production periods" related to each other in a changing world with changing men of changing mood? If people decide to change the time distribution of their current service input, how does this affect the "age distribution" of the output of today, tomorrow, and the immediate future? Is there not a considerable lag of the "real" time structure of production behind the "anticipated" one? And if the "anticipated" period undergoes heavy fluctuations, is it likely or possible that the "real" production structure varies concomitantly? And if this is found to be impossible, is it then not illicit to theorize about fluctuations in the production structure in the short run?

When Mr. Hill raised all these doubts he did not suggest the scrapping of the concepts altogether but a reconsideration, or the discontinuance, of their use in business cycle theory. The reconsideration may lead to a number of distinctions, refinements, qualifications of the concept, and what has been stated about it. So much seems to be clear: (1) that the significant hypotheses about the investment period and its changes refer exclusively to the so-called anticipated period, i.e., to the time distribution of the current input of services; (2) that the "historical"[44] produc-

[43] Hill, "The Period of Production and Industrial Fluctuations," *ibid.*, December, 1933, p. 601. In drawing the distinction Hill followed F. Burkhart, "Die Schemata des stationären Kreislaufs bei Böhm-Bawerk und Marx," *Weltwirtschaftliches Archiv*, Vol. XXXIV (1931).

[44] Mr. Hill speaks (*op. cit.*, p. 603) of the "completed" period rather than of a "historical." It is better to reserve the term "completed" for the discussion of other phenomena in the process of lengthening or shortening the period.

tion structure undoubtedly offers resistance to quick changes or even to fluctuations, a resistance which is the very substance of the explanation of cyclical and other disturbances; (3) that a production period between past input and present output[45] seems to be of no heuristic value for economic theory other than as a historical account of some "given data."

The "view forward" determines the employment of services available. That "it is by its nature hypothetical, representing an average of anticipations which may not be realized"[46] is not in contradiction with the fact that it is very real in its effects on what is being done at any one moment of time.

13. *Current investment versus total investment.*—The clean distinction between the "anticipated" investment period and the "historical" period is more or less the distinction between an economic problem and the data given for its solution. The economic problem is the problem of choice, in this case the problem of distributing the available productive services among purposes of different time index. The data include the total equipment available which is the result of history. The historical time distributions are materialized in the stock of "capital goods," the quantity, composition, and quality (including durability) of which are, of course, of influence upon the present choices as to the distribution of services over time. In other words, "past" investment, through the man-made equipment available "at present," influences (together with other factors) the "present" or current investment for "future" output. The investment function (the only significant one as an economic problem) refers wholly to the current investment. Hence it does not contain what one could call "total investment," i.e., the current investment plus the existing capital

[45] Mr. Hill writes (*op. cit.*, p. 605): "Owing to the existence of fixed capital the structure of production will not contract as rapidly as the anticipated production period. The average time in which existing specific capital-goods . . . . pass into consumers' goods is not likely to change appreciably over a short period." One should not forget that the fact that less or no services are currently employed to construct or reconstruct such fixed capital is quite an "appreciable change," even in the shortest run. Moreover, the "contraction" of the structure of production may be very rapid indeed, if value changes rather than physical changes are considered.

[46] *Ibid.*, p. 610.

goods (durable and non-durable), which are the result of past investments.[47] To mix existing capital goods with current investment and to make out of both one investment function is to mix historical data with economic problems. Past investments, so far as they are materialized in existing equipment (capital goods), certainly influence the shape of the current investment function (the investment period), but they are not contained in it with respect to the productive services which they will yield in the future. Only the productive services rendered at the moment of investment[48] constitute (with their consumption distances) the investment function.

14. *Investment of services of "original" factors versus services in general.*—At this point in the present discussion it is high time to dispense with the idea that only "original" factors of production should be considered. It was undoubtedly a mistake to look only at the services of "labor" and "land," as Böhm-Bawerk did throughout his discussion. Whether it was an inappropriate use of the stationary-state fiction, or whether it was the fear of reasoning in a circle, which led to the exclusion of the services of existing equipment from the investment account, it was a mistake to assume that the services which can be had from capital goods are, apart from their history, different in principle from the services of land and labor. (That there is no homogeneity within these categories should be clear.)[49] At any moment of time the services available from any sources of any kind—"free gifts" of nature as well as human labor-capacity as well as the results of past investment—are "given" for the economic choice. Labor services, land services, machine services, are institutionally, biologically, and

[47] It should be noted that this does not fit into Jevons' terminology. Our "total investment" would correspond to his "amount of capital invested" but not to his "amount of investment of capital." See his *Theory of Political Economy*, chap. vii (esp. p. 229 in the 4th ed.).

[48] To make it indubitably clear: The durability of existing equipment influences the current decisions about current investment and through it the investment period, but it does not enter as an item into the investment function.

[49] See Knight, *Economica*, August, 1934, p. 279. Professor Knight forcefully criticizes the fallacy of distinguishing "primary" from "produced" factors. I also owe much to an unpublished manuscript by Professor Hayek.

historically different, but there is no difference with regard to their economic position in the time structure of investment.

The resources that yield the productive services may be permanent or durable or perishable. The services are perishable altogether because they are related to the single moment of time. The labor hours, land-use hours, machine hours, become, in being employed, the items which constitute the current investment.

15. *The "unit" of investment.*—Labor is not homogeneous in kind, in quality, in efficiency; nor is land or capital goods. There is not much more sense in trying to compare in "physical units" the floor-space hour in a factory with the water-power hour from a river (both in some way related to "nature" or "land") than in comparing them with the labor hour of a bricklayer, or with that of a stockbroker, or with the hourly service from a steel hammer or that from a paper machine. And yet, should all of those services and their time dimensions be "averaged" in an investment period or, at least, brought into one investment function? (An additional complication consists in the circumstance that the special form of employment of transferable and versatile factors sometimes depends on the length of the investment period.)[50]

Is there a way out of the dilemma? Is it fair to "assume" homogeneity of services, to theorize on that basis, and be satisfied with conclusions *per analogiam?* Or is it better to take "value" as the only possible *tertium comparationis?* There may be an impenetrable series of implications in adopting value as the "unit" of input. If it is done, the time dimensions of the productive services being invested at a moment of time would have to be weighted with the values of these services.[51]

16. *Investment period and the amount of capital goods.*—The correlation between the investment period and the amount of capital

[50] Much emphasis was placed on this point by Franz X. Weiss, "Produktionsumwege und Kapitalzins," *Zeitschrift für Volkswirtschaft und Sozialpolitik*, N.F., I (1921), 568–72.

[51] This raises a number of the most serious theoretical problems. The value of productive services is dependent on the value of their future consumable services. Both are dependent on the length of the investment period, since an increase in that period yields an increase in future output. It is not only a matter of space when I abstain from entering into so trying a discussion. I may recall to the reader that

goods has sometimes been held to be true "by definition," sometimes rejected as meaningless or wrong. The customary proofs for the existence of the correlation run again in terms of a stationary state. The assumption of the stationary state implies that the investment function does not change but remains the same through time. The investment function of "today" would look exactly like that of any time in the past, and exactly like that of any time in the future. In this case the amount of capital goods in existence at any moment of time would be a certain function[52] of the investment function. It goes without saying, then, that the investment function and the amount of capital goods in existence are correlative.

Imagine now a change in the system; people start saving and investing; this involves a change in the investment function through a switch of services from lower to higher consumption distances. Assume, furthermore, that the new investment function is being maintained from then on and that the mobility and transformability of capital goods was sufficient to make the change take place without any losses. The changed investment function would tell that the physical quantity of capital goods of any type

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Pigou withdrew the "Pound Sterling worth of resources" from his last editions of the *Economics of Welfare* and substituted physical units for it. The issue was a different one but similar considerations are likely to be relevant in our problem. (Cf. the recent remarks by Howard S. Ellis, *Zeitschrift für Nationalökonomie*, June, 1935, pp. 158–59.)

[52] The investment function, as we defined it, represents the distribution of all services invested at a moment (small interval) of time among uses of different consumption distance. If such an investment function is (for a stationary state) drawn only for the services of original factors, then inverted and transformed to a cumulative function (now looking like Hayek's Fig. 1*b*, in his article in *Economic Journal*, June, 1934, p. 210), then the area under the cumulative investment function represents the stock of produced production goods. (About the simple and the cumulative investment function see also *supra*, p. 588, n. 30.) The statement in the text about the constancy through time of the investment function must be qualified by the further assumption that output is continuous. While cumulative investment functions are insensitive to discontinuities of output, and are therefore constant for a stationary state, the investment function as we defined it would vary according to the crop-distance. This is a technical defect. Better technicians may find an improved mode of expressing the investment function.

will be greater in the future than it is at the moment of change.[53] One could hold, however, that, although the physical quantity of capital goods is still unchanged at the very moment of the change of the investment function, there may be an immediate increase in stock value because of the lower capitalization rate of future income. In other words, the same "causes" which change the investment function change at once the rate of capitalization and, therefore, the value of existing equipment.

Another approach seems to be better adapted to the concepts as we have used them in this discussion. The relationship between the amount of capital goods and the investment period shows itself in both directions. First, the greater the amount of serviceable capital goods in existence, the greater is the part of the current productive services from resources of any kind which can be invested for a more distant future. Thus, the amount of capital goods in existence represents, so to speak, a potentiality of investing more for longer periods. It is a potentiality which has not necessarily to be made use of. (And, indeed, capital goods may lose in value if and when, through a change in time preferences, given "specific" equipment cannot be utilized fully.) But, generally speaking, the investment period tends to be longer the greater the amount of capital goods in existence. Second, if we use an increased part of the given productive services for things of greater time distance, the amount of capital goods in existence will increase. This means that, other things remaining equal, a lengthening of the investment period gradually increases the amount of capital goods in existence.

17. *Investment period and the supply of free capital disposal.*— In a single-plan economy, from the simple economy of the Crusoe type up to a communistic economy, the change in time preference

[53] If all productive services are consumed simultaneously, no "intermediate good" can exist. If production takes time, goods in process, and perhaps tools, are likely to be on the "inventory" at any moment of time. If production is arranged in stages which work continuously, the more goods must be on the inventory the longer the production period which is chosen. With a given input (per time) of productive services the inventory, at any moment of time, must be greater the greater the average time interval is until output is consumed.

(in the plan-makers' taste) and the change in the investment function are analytically the same. The time preference expresses itself in the distribution over time of the use which is made of the productive services currently available.

In an exchange-enterprise economy the time distribution of productive services is not *uno actu* changed with the time preferences on the part of certain individuals. Individuals who save transfer their disposal over services to other individuals who invest. Increased supply of "free capital disposal"[54] tends to reduce the exchange ratio of present to future income, which in turn leads to increased investment of productive services for longer periods. Individuals who disinvest, so far as they cannot draw upon the disposal over services released from individuals who save, withdraw the disposal over services from entrepreneurs. Decreased supply of "free capital disposal" tends to increase the exchange ratio of present to future income, which in turn leads to decreased investment of productive services for longer periods.

In a money-enterprise economy "free capital disposal" is supplied and demanded in the form of "money capital." Insight into the functioning of this system is much impeded by the fact that goods in process are passed over from firm to firm by way of exchange against money, whereby money appears to be free capital disposal for the individual without being so for the community as a whole. This is why the unreal assumption of production vertically integrated in a single firm is so convenient; and why under more realistic assumptions problems of great complexity emerge from monetary changes. So much seems to be clear that an increase in the supply of money capital tends (other things, including the amount of services, being equal) to lengthen the investment period; and, vice versa, a decrease in the supply of money capital tends to shorten the investment period. And this is so, whether disposal over services really is released by savers or withdrawn by dissavers, respectively, or whether only the "elasticity"

[54] I follow Cassel in using the term "capital disposal." It is better to avoid the term "capital" *simpliciter*. The terms "capital goods," "capital disposal," "capital value," "money capital," convey more definite meaning than the ambiguous word "capital."

of the money system does the trick. Thus changes in the investment structure are inseparably linked with the credit cycle.

18. *"At" a point of time versus "within" a period of time versus "for" a period of time.*—Discussions of "capital" and "investment" suffer not only from ambiguous meanings of these terms but also from confusion with respect to their time quality. The terms suggested by Jevons were not striking enough to be accepted by later writers. The "amount of investment of capital" was to mean something different from the "amount of capital invested,"[55] but neither of them was the "amount of capital being invested." The first was to be a product of a multiplication (more correctly, integration) of the amount that has been invested by the time for which it has been invested. The second, the "capital invested," was the amount that has been (and continues to be) invested up to a certain point of time, but without consideration of "the length of time during which it remains invested."[56] In other words, it was the inventory at a point of time. The third is the amount that is being invested within a (very small) interval of time.

"Capital invested" in the sense of capital that has been invested can, in a changing world, apart from setting up a profit-and-loss account, be significantly expressed, not in terms of its (historical) cost—i.e., in terms of the value it had at the time when the investments were made—but only in terms of the present value of the goods or resources which exist as result of those past investments. The present value is, of course, the capitalized income which is expected to accrue from the services from these goods or resources. Since the present value of these goods or resources has not much to do with the historical amounts invested, the term "capital invested" had better not be used for them. "Capital equipment" or "capital goods" are adequate terms.

"Capital invested" in the sense of capital that is being invested within a small interval of time can be expressed in terms of cost or value, both being the same under the assumptions of equilibrium theory. Can this "capital being currently invested" be expressed without time dimension? It certainly needs a reference to

[55] Jevons, *op. cit.* (4th ed.), p. 229. [56] *Ibid.*

the unit of time chosen, since it is a time rate (such as per hour, per day, per week). Is it necessary to add to the time within which it is being invested, also the time for which the investment is to be? The answer to this becomes clear if we recall what is being invested. If we think of capital disposal or of money capital, it can be expressed as a mere quantity without reference to the duration of investment. But if we think of the "real" investment, of productive services, we immediately see that the time dimensions become necessary because almost all productive services employed —except the personal services of servants, actors, etc.—are "invested" and the question is only one of their distribution over time. Under full employment no increase in investment would be conceivable if it were not for the investment of services for periods longer than those for which they were hitherto invested.

This circumstance is, I think, rather significant. The money capital which is being invested need not, and cannot, be assigned to any certain period of investment. Even if the individuals who supply it were quite determined as to the length of time for which they would like to tie it up, or even if the individuals were determined to invest it for eternity, the services which are invested by means of the money capital are invested for a period which is independent of the will of the particular saver. And the single new investment makes, *ceteris paribus* (hence, with the amount of services unchanged), the average period of investment just a little longer than it was before. If there is full employment, the increase in the amount of money capital being invested per unit of time increases the period for which the services are being invested on the average.

19. *Capital per capita.*—Productive services are distributed among uses of different consumption distance. To distribute a given amount of services is one problem. To distribute the services from a given amount of resources and men is another problem, because the capacity of resources and men may not be utilized fully. To distribute the services from a changing amount of resources and men is a third problem. It goes without saying that these distinctions are highly relevant for the problem of the average period of investment or, more correctly, for the problem of comparing investment structures.

A greater amount of services distributed over time (over consumption distances) in the same proportions as a smaller amount of services means, of course, an unchanged average period. Should there be an increase in the number of men employed, the amount of other resources would have to increase too, if a change in time distribution is to be avoided. This is often expressed by saying that changes in the average period of investment can be seen by changes in the amount of "capital per head." If population grows more quickly than capital equipment, with the result that less "capital per head" is available, shorter periods of investment become necessary. On the other hand, increased investment permits lengthened investment periods only so far as it is not accompanied by a proportional increase in men.

This interrelation (which I chose to formulate as a statement of tendencies) is sometimes suggested in the form of an analytical statement. If a cumulative investment function is drawn in the customary way (representing cumulatively the amounts of services applied at successive moments of time in the course of one process of producing the output finished at one moment of time),[57] the area under this investment curve is defined as capital (more correctly, capital goods in terms of incorporated services). The average period of investment is measured by dividing the area under the curve by the final output (i.e., by the income measured in terms of input or incorporated services.) This division represents, by definition, the ratio between capital and income.[58] If only labor income, rather than total income, is considered, and if it is (according to the ordinates of these diagrams) expressed in terms of service input, the analogous division gives the ratio between capital and labor services, or, if labor hours per laborer are fixed, capital per head.[59]

[57] See, among recent publications, the diagram in Marschak's article, *Economic Journal*, March, 1934, p. 147, or Fig. 1*a* in Hayek's article, *ibid.*, June, 1934, p. 210. For a short explanation see above, p. 588, n. 30.

[58] Professor Knight (*Economic Journal*, p. 88) considers this ratio "one of the least meaningful."

[59] Which of the two ratios is more significant for capital theory is still an open question. The discussion in the following paragraph places more emphasis on the second ratio. I owe much to Dr. Marschak's previously cited article and to his unpublished contribution to our private "round-letter" discussion.

An increased supply of money capital with unemployed labor services available would lead to an absorption into the production process of more labor services rather than—or in addition to—a redistribution over longer investment periods of the hitherto employed services. (Without increase in the supply of money capital, such absorption would be practicable only by a shortening of the investment period with lower returns to labor services). There would, however, be a different sequence of events if the additional money capital is supplied by an expansion of bank credit from what it would be if it were supplied by voluntary saving, i.e., under voluntary abstinence from consumption.

20. *The proportion between the factors employed.*—The reflections upon "capital per head" above suggest the coherence between the concepts of the "investment period" and the "proportion between the factors employed." So far as changes in the investment period are connected with changes in methods of production within single industries or even single firms, reasoning in terms of proportion between factors becomes necessary. A single firm which, under the influence of lower interest rates, buys new machines to substitute them for less efficient ones or for labor services, certainly does not calculate investment periods. The firm makes cost comparisons, and the elasticity of substitution[60] will, among other conditions, be decisive for the firm's choice. The result is, for the particular section of the economic system, to be stated only in terms of the proportions in which the factors are employed by the single firm or industry.

An average investment period or a certain investment function becomes significant only for the community as a whole. In a total system analysis it will sometimes be more convenient to theorize in terms of the proportion between the factors employed, sometimes in terms of the investment period. The use of the latter conception recommends itself in all problems where explanations of changes through time are essential. The "analytical correlation,"

[60] See J. R. Hicks, *The Theory of Wages* (London, 1932), p. 117; Joan Robinson, *The Economics of Imperfect Competition* (London, 1933), pp. 256–60; C. H. P. Gifford, *Econometrica*, April, 1935, pp. 208–10; Fritz Machlup, "The Commonsense of the Elasticity of Substitution," *Review of Economic Studies*, Vol. II (June, 1935).

mentioned in the preceding paragraph, is, of course, without significance for causal relations. What are really significant are questions as to the probable effect upon the investment period of an increased supply of money capital, and as to the effect upon the quantity of capital goods (producers' goods) of a lengthening of the investment period. Lags and friction in the realization of such sequences are not unimportant; the appreciation (increase in present value) of the bulk of existing capital goods in the case of a lengthening is not less relevant than the differentials for longer-lived and shorter-lived goods and (in the case of a sudden increase in voluntary saving) the depreciation of some specific instruments adapted for the production of consumers' goods.

The chances for a statistical measurement of the investment period are not too good,[61] for reasons which have been sufficiently indicated in the discussion of the difficulties and complications. Of these difficulties the greatest is the problem of comparability—which is present throughout the field of economic statistics and is comprehensible to anybody who has a clear understanding of subjective value theory. The chief working hypothesis of every statistical attempt at measuring the investment period seems to be its approximate correlation with the proportions in which the factors are employed.[62]

IV. SPECIAL PROBLEMS

21. *Width of income stream versus length of investment period.*—A great many economists substitute for the concept of the "length of the investment period" the concept of the "width of the income stream." The latter concept does not encounter so many complications as the former and has the advantage of not only suggesting a picture readily grasped but also of easily fitting into any analysis of economic dynamics, i.e., of fluctuating, progressive, or declining

[61] See Marschak, "Economic Parameters in a Stationary Society with Monetary Circulation," *Econometrica*, January, 1934; and Gifford, *Econometrica*, April, 1935.

[62] Lack of statistical "verification," or even theoretical impossibility of measurement, is no evidence whatsoever against the usefulness of a concept. As Professor Knight has said, absolutely to the point, clear and indispensable notions often "cannot be given exact definition; but this limitation applies to all quantitative analysis in economics" (*Economic Journal*, March, 1935, p. 90 n.).

economies. Saving is pictured as a narrowing of the income stream, which later becomes wider again, wider than it was before the narrowing; dissaving is pictured as a widening of the stream, which later becomes narrower again, narrower that it was before the widening. There are possibilities of continuous and of discontinuous changes in the width—in short, the concept is useful and adaptable.

Yet, it is a mistake to believe that one could dispose of the investment-period concept without disposing of one of its most significant purposes: to solve the time problem. Of course the "income stream" is a function of time, but one which remains unknown as long as the "investment period" is not introduced. It is certainly true that the income stream becomes wider again after having been narrowed by voluntary saving—but only after a while. After how long a while? How long a time does it take before the widening of the income stream occurs, and how long before the "abstinence" is fully offset? The answer may be sought by using a concept like the "investment period," or it may not be sought at all. What relates the changes in width of the income stream with one another is the investment period which has been thought to have been thrown overboard. That these intervals have meaning and significance is admitted by almost every economist—even by Professor Knight.[63]

22. *Investment period and the "stages of production."*—In discussions of the length of the investment period one ordinarily meets also propositions about the "stages of production." It would, however, be too optimistic to believe that these terms have a clear and unambiguous meaning. Although there is much over-

[63] See *Economica*, August, 1934, p. 273: "In reality most investments not only begin *at a fairly early date* to yield their income in consumable services . . . . but in addition they begin *fairly soon* to yield more than interest on cost in this form, and entirely liquidate themselves *in a moderate period of time*" (italics are mine). Or, on p. 278: "Any net saving and investment naturally means reduction in consumption somewhere and subsequent increase somewhere, raising the total rate of consumption in the system above that obtaining before saving started, the increase measuring the rate of return. In terms of *income* sacrificed for an interval and ultimately more than made up, the notions of roundaboutness and waiting have some meaning . . . ." (italics are Professor Knight's). Any investment is displaced earlier consumption income; this is the very point of the theory of the investment period.

lapping, one can distinguish "stages" of production in terms of (*a*) units of technical acts or divisions of the process (different acts), (*b*) locational units (different plants, buildings), (*c*) vocational units (different crafts, professions), (*d*) financial units (different firms), (*e*) time units (different consumption distances). Only the last of these concepts is inherently connected with the concept of the investment period, while the others are sometimes merely phases of the underlying technical conditions, sometimes among the more or less probable accompanying phenomena, but sometimes entirely unconnected.

In the attempt at illustrating an abstract exposition by concrete examples many authors pictured the lengthening of the investment period by pointing to the introduction of certain technical or financial stages of production. Readers—indeed, sometimes the authors themselves—then took the technical or financial properties of the process for the essential factors. In the discussion of production processes without durable instruments, the divergence of the technical stages from those in terms of "time distance from consumption" is not too disturbing; but when durable instruments are introduced into the scheme, the divergence between the two concepts becomes considerable. The steel plant and the machine shop, two definitive stages, of course, in the technical process, represent by no means two stages in the sense of consumption distance but an infinite number of such stages. One has to keep in mind that services employed for the making of a machine are, as to their consumption distances, distributed over a great range of time. Unless one goes through the procedure of averaging these time distributions for any single unit of equipment, or unit of plant—which is neither necessary nor possible—one must not consider a certain technical stage of production as a certain time stage of production.

The divergence between financial stages and time stages is not much less remarkable. This was not made clear enough by Professor Hayek in his *Prices and Production*, and led to much confusion. His diagrams are devised to show the money stream between the financial units engaged in the production process. That the lengthening of the investment period (i.e., the increase in the

time stages of production) would involve an increase in money transactions to be performed because of an increase in the number of financial stages of production was an assumption of Professor Hayek's which he certainly did not state clearly enough and which was justly criticized by Professor Ellis.[64] In anticipation of the confusion, Böhm-Bawerk had expressly given warning that the length "of the process, its extension or its curtailment . . . . is not measured by the number of independent intermediate members which the production process embraces."[65]

23. *The investment period during new capital construction.*—"In a sense, *all* work done in a stationary society is replacement work."[66] This mode of approach has perhaps much more justification than the crude division of the production system into producers' goods and consumers' goods production, whereby the "early stages" of production are assumed to be engaged in the one, the "later stages" in the other part of that process. According to this last view, the number or the work of the earlier stages is imagined to be increased if society becomes progressive. The question then arises whether lengthening of the investment period is not confined to the period of capital accumulation, while shortening occurs when the process of accumulation comes to an end and a stationary state sets in.

This is Professor Knight's view. If more capital goods are constructed, he says, "there will be, *temporarily* (while the expansion is taking place, but not after it is completed), a slight increase in the proportion of goods in the earlier stages of processing operations, in comparison with later stages."[67] It will be shown, nevertheless, that a society which stops constructing new capital and confines itself to maintaining capital does stop lengthening its investment period; it need not shorten it if the transition is not too sudden.

[64] Howard S. Ellis, *German Monetary Theory, 1905–1933*, ("Harvard Economic Studies," Vol. XLIV), p. 354. "A given increment of capital has nothing to do with the number of independent productive stages through which the intermediate products pass."

[65] *Positive Theory*, p. 91.

[66] Marschak, *Economic Journal*, March, 1934, p. 151.

[67] Knight, *Economic Journal*, March, 1935, p. 78 (italics are his).

The essential point in the argument is the gradual transition from a state of new capital formation to a state of pure capital maintenance. It is easy to see that there is a rate at which new saving and investing may slow down, and finally dwindle, without necessitating a shortening of the investment period (and difficulties in the construction-goods industry). Any increment of capital involves an increment in replacement funds necessary for full maintenance. If society is "progressive" but at a decreasing rate, the funds supplied for maintenance still continue to increase. The decrease in the supply of new savings may, therefore, be compensated by the increase in the supply of replacement fund, so that the total supply of free capital disposal remains equal.[68] In other words, the increase in construction of equipment for replacement purposes may offset the decrease in construction of new capital equipment. If the rate at which saving and investing falls off does not surpass these limits,[69] no shortening of the investment period need ensue.

On the other hand, it should be noted that if the increase in capital takes place within too short an interval, it will not be sufficient to maintain the lengthened investment period. If in an economy which has been stationary hitherto one single investment is made and not followed by any further complementary investments, the single investment is, generally, bound to be wasted.[70] The lengthening of the production process is itself a process which needs time to be completed and, hence, to become definitive. But if after a sufficiently long phase of capital formation the transition from this phase to a phase of pure maintenance of capital is gradual enough to "permit the processes which have already been

[68] Suppose a current replacement fund of 300 units and new capital formation of 40. In the next interval the replacement fund will have to be (if the replacement quota is 10 per cent) 304 so that new capital formation can fall to 36 without causing a reduction in the supply of capital disposal (see Fritz Machlup, *Börsenkredit, Industriekredit und Kapitalbildung* [Vienna, 1931], p. 106).

[69] These limits are determined, as shown by Fowler (*The Depreciation of Capital* [London, 1934], pp. 36–54), by the average durability and its relation to the average construction period of capital goods. Here is the place where these concepts used by Professor Knight (see above, sec. 9) adequately come in.

[70] For detailed explanations, see my book, *op. cit.*, pp. 103–11; and Hayek, *Econometrica*, April, 1934, pp. 153–58.

started to be completed,"[71] the lengthening of the investment period will have been not temporary but definitive.

24. *Changes in demand.*—Changes in the investment period are not always caused by changes in time preferences. Purely qualitative changes in demand of intentionally equal time index may cause changes in the investment function. For a single-plan economy, however, this is not true, since the omniscient plan-makers will see whether or not the changed tastes can be satisfied without any different, or more or less, equipment and, hence, without any changes in the time distribution of services. If changed tastes could be satisfied only by a changed time structure of production, the plan-makers would immediately have to balance the displaced alternatives, which in this case would be alternatives of different time index. In a money-enterprise economy the situation is different, because of the lag of cost reactions behind consumers' choices. The prices of consumers' goods between which the individuals choose may be, at the time of the choice, different from what they would be after all rearrangements of productive services necessary for the provision of the goods demanded had been performed or calculated. The change in investment periods comes about by way of interactions of entrepreneurs, and it is only through consecutive changes in prices that consumers find their changed tastes to be incompatible with unchanged time preferences.

Using less abstract language, we may say that the consumers' choices between goods made from different materials or made in different types might cause major adaptations in the productive equipment. If the specificity of equipment does not permit technical adaptation, the change can be made only out of replacement funds. The quasi-rent in the still underequipped line of production becomes apparent in higher rates of interest offered for free capital disposal. In this way replacement funds not only from the overequipped line of production (overequipped relative to the changed demand) but also from quite different industries are attracted by the more profitable production. Resulting price increases in other products force the consumer to reconsider the

[71] Hayek, *ibid.*, p. 157.

distribution of his budget. (This redistribution may include the item "saving" because it is not only prices of commodities but also the rate of interest which undergo change.)

The adaptation in the productive apparatus to a change in demand may lead either to merely temporary or to definitive changes in the investment structure. This depends on two circumstances: first, a change in demand so sudden and sharp that the producers of the product that fell into disfavor cannot earn any replacement quotas (definitive loss of the sunk investment) will tend to definitive shortening of the investment period; second, the quasi-rents of the producers of the favored product, if saved and invested, might counteract the first tendency.

There is another point calling for attention. Apart from the losses and gains of transition, differences in the "capital intensity" of the goods between which the demand has shifted may be important. The favored product may not only need different equipment but more or less equipment than the product in disfavor has needed for its production. The shift in demand may, for instance, finally be "capital saving." (Crude examples: Tents preferred to houses; services of stage actors preferred to services of automobiles.) Whether or not such changes lead to shorter investment periods depends on many questions, e.g., whether consumers use all the money diverted from capital-intensive products for purchases of less capital-needing products (or what else they use it for); whether the sunk capital can be extracted from the industries in disfavor; whether the capital extracted from these industries is used for reinvestment elsewhere (probably under reduced interest rates), etc.

In an economy in which new savings are continually forthcoming, a part of the new savings will be used for financing the adaptations of equipment to changed demand. Since the presumption that net losses of capital are connected with these adaptations is very great, it is fair to assume that an economy can be stationary in respect to its capital base only if it provides new savings to rebuild its equipment needed for changed tastes. An economy which is stationary in terms of new savings (i.e., savings are zero) is declining in respect to its capital base, if changes in demand oc-

cur. Or, to put it in another way, "quick change in the objects of consumption without the emergence of new savings is itself a form of consuming capital."[72] Changes in demand represent, therefore, one of the qualifications of the proposition that any increase in the supply of capital disposal leads to a lengthening of the investment period. Changes in demand represent, furthermore, one of the important, but neglected, points in the theory of the natural rate of interest. Changes in demand tend to raise the equilibrium rate of interest[73] and may involve a sufficient impulse for an (inflationary) expansion of bank credit.

25. *Changes in technical knowledge* (*inventions*).—The invention case was the basis of the very first critical discussions following publication of Böhm-Bawerk's *Positive Theory*. The greatest part of these discussions was occupied by repetitions of simple misunderstandings. The misnomer "period of production" led critics to look at the duration of the direct technical production process proper, and then to believe that almost all inventions shorten this period. Sewing by hand is a much slower method of making dresses than sewing by machine. Hence, thought the critics, the production period was shortened by the invention of the sewing machine. Böhm-Bawerk had a hard time to explain that sewing of the dress was only the last part of the process, while in the process as a whole services were invested in iron production and machine shops and in the sewing machine and only finally in the dressmaking.[74]

In his ardor to refute the assertion that the production period is shortened by such inventions, Böhm went so far as to assure us

[72] Machlup, "The Consumption of Capital in Austria," *Review of Economic Statistics*, XVII (January, 1935), 14.

[73] The effect upon the equilibrium rate of interest of changes in demand can be the result of several opportunities of investment, e.g.: (*a*) financing technical adaptations; (*b*) financing quick construction of the *different* equipment needed for the newly favored product; (*c*) financing construction of the *increased* equipment if the newly favored product is capital-intensive; (*d*) financing construction of different and increased equipment which was, due to lumpiness, hitherto not to be used profitably but becomes so if the demand for the newly favored product reaches a certain minimum.

[74] See especially Böhm-Bawerk's "Exkurse," e.g., "Exkurs II," in *Positive Theorie des Kapitales*, II (4th ed.), 44.

of the contrary, which is not true either. The invention neither shortens nor lengthens the investment period. All it does is to make investment opportunities more or less profitable. If and when new capital disposal is supplied (e.g., by new savings), then the investment period can be lengthened. But if these new savings would have come forth in any case, then the investment period would have been lengthened in any case. The new invention, if it was of the mentioned type, merely made the interest rate higher than it would have been otherwise.

If there is no increase in the supply of money capital above the current supply of replacement funds, then there is generally no possibility of a lengthening of the investment period. But if the new invention is connected with some especially durable instruments, will not substitution of new instruments of itself involve a lengthening of the investment period? If exploitation of the invention appears to be profitable in spite of its taking so much capital away from other industries (under a sharp rise of the interest rate), so many other investments which would otherwise have been made are omitted that the investment period is left unchanged. The high rate of interest might, of course, induce people to save or to dissave, and in this way lead to a change in the investment period.

New inventions may suggest new sorts of equipment which compete with, and render obsolete, existing equipment. This may cause major losses of sunk investment; the investment period may be shortened (in case replacement funds have to be attracted from other industries) or may be left unchanged (in case new savings are just sufficient to finance the new investment) or lengthened in a smaller degree than would otherwise have been possible. But it would be quite unwarranted to consider this a social loss. If an undiminished or even increased product can be provided with less capital or in a shorter investment period, there is no reason for resenting such a development. (Of course, if the inventions had been known many years earlier, many past investments would have been made differently and their obsolescence saved.) Obsolescence occurs if the new equipment is relatively more efficient or if it is cheaper. The latter is a case of a "capital-saving" inven-

tion. The old equipment is depreciated to the lower value of the new, because the price of the products of this equipment would no longer cover replacement of the former value. What the consumer had to contribute to this replacement now becomes his increased purchasing power, which may be spent for increased consumption or which may be saved. The capital loss through obsolescence is capital consumption in the sense that it is accompanied by increased consumption, but it is not capital consumption in the sense that it renders impossible permanent maintenance of consumption on the higher level.

In substance, the effect of inventions, capital-needing or capital-saving, upon the investment period is per se neither lengthening nor shortening; their indirect effects depend on the incidental losses of transition and on the incidental changes in saving and dissaving.

26. *Investment period and disinvestment period.*—Changes in technique, it has just been shown, need not involve changes in the investment period. But neither need changes in the investment period involve changes in the technical methods employed. In an economy where no durable goods exist and where no technical substitutability exists, so that the proportions between the factors in the production of any one product are fixed, shortening of the investment period would be possible through changes in the relative proportions of different industries. There are two ways of shortening the investment period without changing the technique of production in an economy which employs durable goods. One way is changing the proportions between industries; the other is neglecting temporarily the replacement of durable goods. To say this is not to assert that these are the only or the most likely procedures in disinvesting societies; but it is necessary to warn against the belief that an unchanged technique of production offers any evidence for an unchanged investment structure.

Consideration of the "disinvestment period" is necessary for the analysis of a number of problems connected with capital disinvestment either as a phase of the business cycle or as a general trend,[75] as well as of problems connected with the adaptation of

[75] See Machlup, "The Consumption of Capital in Austria," *Review of Economic Statistics*, XVII (January, 1935).

specific capital equipments to changing conditions. It is nevertheless not true that immobility or specificity of equipment are the only factors that matter. Even if every good were perfectly transformable into any other good, if we, therefore, could eat up machines and buildings directly rather than through a lengthy process of undermaintenance, even then the disinvestment period would remain significant for the questions how long "overconsumption" can be continued, and after what interval the consecutive shrinkage in width of the consumption stream will come about.

The statement that "in equilibrium the period of investment for the total volume of capital . . . . is equal to the period of disinvestment"[76] is liable to misinterpretation. Within what time the total capital of society can be disinvested is not the point in question. The notion of the investment period, being an "average" of an infinite number of time indices, would not help to answer such a question. To put the question for the length of the disinvestment period in terms of an individual investment would be still less sensible. The individual investor can exchange his property rights against present consumption income (of course not at a fixed ratio) at any time, whether they are taken over out of new savings or, in want of new savings, out of some replacement funds. And the marginal investment at one moment of time will hardly concern the same lines of production as the marginal disinvestment at another moment.

The use of replacement funds for "taking over" property rights of disinvesting individuals, hence the use of replacement funds for the disinvestors' consumption,[77] is the essential point. The speed or rate of supply of replacement funds, on the one hand, the consequences of withdrawing parts of them from reinvestment, on the other hand, are dependent on the time structure of investment. The average time interval from investment to consumption is also the average time interval from investment to the forthcoming of the capital disposal free for reinvestment, because it is the receipts

[76] Fowler, *The Depreciation of Capital*, p. 35.

[77] Not necessarily the disinvestors' personal consumption; if they disinvest, say, in order to pay taxes, state employees might be the persons who do the consuming. Disinvestment for the sake of financial liquidity is to be discussed later.

from the sales of the consumption goods which provide the replacement quotas for all the earlier stages of production.[78]

Imagine a barter-enterprise economy with vertically integrated production. The entrepreneur exchanges the final products of his production, or other consumption goods which he received in exchange for his, against productive services, if he wants to continue the enterprise, i.e., if he wants to reinvest. But he eats them himself if he does not want to reinvest. In a money-enterprise economy the money receipts for the final consumption goods are the funds available for reinvestment or disinvestment. The industry where a disinvestment takes place—i.e., where reinvestment is omitted—need by no means be the same as, or be closely connected with, the industry which received for its products the money that "financed" the disinvestment, first, because replacement, though continuous in the economy as a whole, is not continuous in single lines of production; second, because the money capital circulating in an economy with vertically differentiated production (i.e., not integrated in one firm) is a multiple of the "real" replacement funds. This monetary phenomenon is partly responsible for the difficulties, in practice as well as in theory, which result from the fact that the money capital *de facto* available for disinvestment exceeds in so large a degree the money capital "genuinely" released from production through the final sale of consumption goods. The meaning of these phrases is more readily apparent if one imagines the money funds which would be available for reinvestment or disinvestment in an economy with vertically integrated production.

V. THE CREDIT CYCLE

27. *Credit expansion and investment period.*—Analysis of the consequences of an increase in the amount of money capital given to entrepreneurs has to cover a number of possibilities. Apart from an increase in the holdings of cash reserves (hoarding), and from an increase in the money work to be done on account of a possible increase in "interfirm transactions," the incre-

[78] On this point see my *Börsenkredit, Industriekredit und Kapitalbildung*, pp. 15–16; and Strigl, *Kapital und Produktion*, pp. 30–37.

ment in money capital may be used (1) for employing a given amount of services for other work than that for which they were hitherto employed; (2) for paying higher rates per unit of service; (3) for employing a greater amount of services from the factors hitherto employed (longer labor week); (4) for employing a greater amount of services from factors hitherto unemployed.

An analysis that begins with full employment and given supply of services has to take into consideration only the possibilities (1) and (2). But these two will have to go together under almost all assumptions. If the increase in the amount of money capital given to producers is due to voluntary saving, hence to a decrease in the amount of money spent directly on consumers' goods, the tendency toward a rise in the prices of productive services will be smallest. But there will still be a tendency for such a rise, because marginal-value productivity of labor services should be assumed to rise in those employments which are made profitable by the interest-rate reduction that accompanies the increased supply of money capital. The rise in wage rates will, of course, be sharper if not voluntary saving (abstinence from consumption), but credit expansion is the source of the increased supply of money capital. But in both cases the first of the mentioned possibilities is rather certain to come true, and, according to what has been said above (see especially secs. 17 and 18), the work that will be favored at the expense of some other work will be of a type that yields consumable services at, on the average, more distant points of time.

The sequences of events characterized as lengthening of the investment period have mostly been described for the case of a fixed supply of productive services. Increased employment of services —i.e., the possibilities (3) and (4) above—have been ruled out. This was correct as a first approximation, but a further step is to analyze the sequences without the assumption of fixed supply of productive services.

The inclusion of the possibility (3)—i.e., of employing more services from an unchanged number of men—is theoretically fascinating (because of the interesting complications in assuming various shapes of labor supply curves), but it has less practical significance than the possibility (4)—i.e., employing formerly unem-

ployed factors of production. The absorption into the productive process of unemployed factors has been regarded by many writers as the realistic case where the irrelevance of an investment-period theory for the analysis of credit expansion would become apparent. And this for two reasons: first, it has been said that if sufficient productive capacity is available no services have to be withdrawn from consumption-goods industries as, owing to an expansion of credit, the production of investment-goods industries is extended; second, the amount of service input being increased, the increased investment need not involve any lengthening of the investment period. There is more investment, but there are also more productive services, hence no change in proportion and no "distortion of the investment structure" will ensue.

The correctness of this view and the applicability of an investment-cycle theory are not incompatible. One has to bear in mind that, according to the capital theory under consideration, an increased amount of services can be employed, without additional voluntary abstinence from consumption, only if the investment period is shortened[79] and the earnings per unit of service are reduced. By employing more services, through credit expansion, at unreduced rates of earnings without voluntary saving, the investment period, absolutely unchanged, becomes longer than it would be without credit expansion.

The case of credit expansion with full employment and that without full employment are, therefore, equivalent in respect to the fact that the investment period becomes longer than it would

[79] Less capital per head is available. See above, p. 590, and also p. 605. It need not be explained that the return to labor is smaller the shorter the period of investment. In terms of cost theory one would speak of decreasing returns of increased application of labor, or of increasing marginal cost of production. A qualification should be made with reference to the unused capacity argument. If unused capacity of equipment of all sorts is available in all stages of production, and if materials, goods in process, and finished goods of all kinds are on stock in sufficient quantities, synchronized production (and consumption) could set in at a stroke all at once. No additional waiting for intermediate or finished goods would be needed. (Why there should be unemployment, under such circumstances, is, however, hardly intelligible.)

be if the supply of money capital were confined to its "natural"[80] sources: namely, replacement funds and voluntary savings.

28. *Investment period and inevitableness of the breakdown.*—Absolute or relative overlengthening of the investment period is the probable result of expansion of producers' credit. The length is excessive in the sense that without any "outside" influences (without change in data) internal forces will lead to a reshortening of the investment period, sooner or later. The "internal forces" consist in a divergence between the individual time preferences (as expressed in the proportions in which the money incomes are saved and invested or spent for consumers' goods) and the time structure of production. The divergence is concealed so long as the credit system continues to subsidize successfully the employment of productive services for work of great consumption distance—work which would not be done if the voluntary distribution of the existing money funds alone were decisive for production.

A discussion of the details of business-cycle theory and monetary management cannot be embarked upon here. But all that is needed here is to point to the essential connection between investment period and credit cycle. While some writers find the causes of the breakdown of prosperity in the imperfections of monetary institutions or in lack of skill of monetary authorities, the investment-cycle theory suggests that there is no money system and no credit management conceivable which could permanently maintain a production structure (i.e., time distribution of productive services) which does not correspond to the structure of expenditures (i.e., time distribution of purchasing power). Though monetary forces help to bring about "prosperity," and lead to the excessive length of the investment period, monetary forces do not seem to be capable of maintaining it permanently.

Why the boom is doomed is explained by the investment-cycle

[80] No value judgment is implied in using the word "natural" as distinguished from "artificial." The "natural" sources refer to the concept of the "natural" rate of interest, which is simply that rate which equalizes the demand for money capital to the amount supplied out of replacement funds and voluntary savings.

theory. This theory does not make the pretense of being the only explanation of all cycles and crises that have ever occurred, nor does it pretend that it states unconditional necessities. The gist of the theory is that there is a high chance that increased bank credit,[81] unless offset by hoarding or similar phenomena, makes for investment periods different from what they would be otherwise; that there is, furthermore, almost no chance that the distribution of expenditures in consecutive phases will adapt itself to the investment structure;[82] and that, therefore, the investment structure will be forced to undergo a process of readjustment.

29. *Liquidation for consumption versus liquidation for liquidity.* —The "liquidation mania" commonly observed during crises and depression, the urgent attempts to exchange capital goods and property rights for liquid funds, are not motivated by the wish to use the liquid funds for buying consumption goods but by the wish to keep the liquid funds on reserve. These rather obvious facts are taken by some writers for the whole substance behind the notion of depression. The struggle for liquidity alone is held to account for the disinvestment after prosperity. Hence, the breakdown is considered either as the result of psychic (or psychopathic) phenomena or as the result of the failure of the credit system to supply the money necessary to satisfy this increased demand for liquidity.

Nobody can seriously question the fact or the significance of this "liquidation for liquidity." But this clearly visible fact should not lead us to forget that it is as a rule preceded and, in a sense, "caused" by "liquidation for consumption." This "liquidation for consumption" is the discontinuance of activities of great consumption distance forced upon, or suggested to, the entrepreneurs through lack of capital disposal or through cost increases which are but the expression of the comparatively more urgent demand

[81] Increased utilization of bank balances may take the place of increased amounts of bank balances. (Increase in V' rather than increase in M', i.e., "dishoarding.")

[82] The adaptation of the expenditure distribution to an excessive period of investment would consist in providing increased savings to take the place of infusions of new bank credit.

for consumption goods. That the use of productive services ceases to be profitable for a certain kind of work is the expression of the buyers' preference for other products, e.g., for "present" consumption goods. The first attempts at disinvesting—i.e., the failure to reinvest in work of great consumption distance—may easily, and actually did mostly, start a general flight from investment into greater holdings of cash. Although in reality the two types of liquidation are ordinarily combined, they should be distinguished in theoretical analysis. Complete absence of the liquidity rush would not imply elimination of the business cycle or of depression; only the depth of the trough, the amplitude of the cycle, would be much smaller.

30. *Deflation and shortening of the investment period.*—How much of the difficulties and frictions would be taken away from society if deflationary liquidation did not accompany and aggravate consumptive liquidation cannot be known. But that the shortening of the investment period is connected with difficulties and frictions of its own seems to be certain. They may result from several circumstances: (1) Many capital goods are specific, i.e., not capable of being used for other purposes than those they were originally planned for; major losses follow then from the change in production structure. (2) Capital values in general—i.e., anticipated values of future income—are reduced by higher rates of capitalization; the owners of capital goods and property rights experience, therefore, serious losses. (3) Specific capital goods serviceable as "complementary" equipment for those lines of production which would correspond to the consumers' demand are probably not ready; employment in these lines is, therefore, smaller than it could be otherwise. (4) Marginal-value productivity of labor in shorter investment periods is lower; wage rates are, therefore, depressed. (5) Under inflexible wage rates unemployment ensues from the decreased demand prices for labor.

That capital loss, wage cuts, and unemployment can be explained apart from any deflation does not mean that in reality they are not entangled with deflation. We said before, and repeat here, that deflation, though sometimes "caused" by the process of

shortening the investment period, aggravates this process considerably.[83]

31. *Immobility of factors and rigidity of costs.*—The immobility and specificity of capital goods—strengthening the resistance to adaptation and adjustment—has something to do with the durability of instruments and thereby with the investment period. But, as Professor Knight points out correctly, there is no definite relation between durability and the lack of adaptability.[84] And there is certainly not the least economic connection between investment period and the main force of resistance to adjustment: cost rigidity. Hence, with immobility of factors (human and produced) and rigidity of costs (labor and material) as the essential factors of the trouble, the period of investment would have no place in the analysis of depression.

If capital goods were mobile and perfectly adaptable there would be no unused plant capacity. And "if labor were mobile and wages flexible, no fixity in the capital structure would give rise to unemployment."[85] And yet, to explain unemployment (through wage stickiness) is one thing; to explain the business cycle is another. If wages were perfectly flexible there would perhaps be no sharp fluctuations in employment, but there would be fluctuations in wage rates instead. Why the perfectly flexible wage rates go up through some length of time and why they fall most heavily through some succeeding length of time—in other words, why there is boom and depression, and whether and why depression must follow the boom—would still remain open questions. For a theory of the business cycle, with no unemployment but wage fluctuations instead, the concept of the investment period would be as valuable a tool as it is for the theory of the business cycle with little wage flexibility and unemployment.

[83] To state this is by no means to advocate reflationary measures. Although they may offset hoarding and mitigate the difficulties connected with it, they may also interfere with, and actually delay, the necessary adaptations in the production structure.

[84] *Economic Journal*, March, 1935, p. 93; *Canadian Journal*, February, 1935, p. 21.

[85] Knight, *Economic Journal*, March, 1935, p. 94.

COMMENT

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To take up Professor Machlup's argument and analyze it in detail would mean in part to rehash the content of my papers which he quotes and in part to deal with extraneous issues. The main point I have raised has to do with the interpretation of quantity of capital as a time period of any sort. In this connection, Professor Machlup seems to me merely to substitute one phrase for another, "consumption distance" for "production period," and to assert or assume over and over, without attempting to show any connection, that the "distance" corresponds with and explains capital quantity. I deny that any such interval has practical significance or even determinate meaning. Passing over the case of a society in the course of liquidation, the interval by which production precedes consumption is either zero or infinity. It is zero for the production of final product (services) currently consumed, which production includes the maintenance of capital goods used, maintenance in turn including any replacements necessary. The interval is infinity, as regards the consumable product, for that "production" in which present services of productive agents are used to create new productive agents to be used in the future to produce consumable services. For, as Professor Machlup observes, it is a truism that the agents maintain themselves until they are liquidated, but he prefers to ignore the fact that, as capital, they are not liquidated short of a general liquidation of society. This means that the product-stream must be considered as perpetual. ("New productive agents" means an addition to the social total, a concept which cannot be accurately measured; but the accuracy of all economic planning for the future is limited to the accuracy with which it is estimated.) If in any instance the new capital good is taken as the product, the interval between any increment of productive outlay and its value result is again zero. Assuming that productive effort is intelligently applied, it results

in an equivalent value from moment to moment. If the two types of production are considered together, no average interval for the two has meaning, since all the magnitudes to be averaged are zero or infinity.

The only sense in which there is a finite time lag of consumption behind production is that it takes time to *change* production, to increase or decrease it, or shift from one field to another. This, too, is the natural interpretation of the distance between a productive effort and the product increment "dependent" upon it. This interval also is undefinable in general terms. It is infinitely various from one situation to another in the same society, and is always a function of the costs, including capital losses, which the price incentive to change will cover and justify. In particular, there is no definite relation between speed of change and capital quantity, in the society or in the industry affected, though the construction period and service life of capital instruments affect it, along with innumerable other factors. (All these negations really hold also for a society in course of liquidation, but the economic theory of such a system is a special problem which I have not cared to go into.) My question regarding the milk and the cow may be re-worded in terms of "dependence," and still seems to me pertinent and decisive. Will Professor Machlup or any advocate of his position tell me how to date the productive act or expenditure in the past on which a particular glass of milk is "dependent"? or the future product increment "dependent" on a particular feeding of a cow? Until this question is answered, I see little point in arguing matters which seem to me not to touch the main issue.

Professor Machlup's entire argument seems to assume that capital is consumed in some definite period, in spite of his observation that the contrary is a truism. It is *partly* true that the things in which capital is invested are consumed, but this does not mean that the capital is disinvested. Disinvestment is not in question unless society is decadent. The issues in management and planning have to do with mobility, and especially with convertibility into money. Moreover, freedom to disinvest capital, once invested, is largely a delusion. As regards the capital of society as a

whole, or any large fraction of it, this surely does not call for argument. But even the freedom of the individual owner to disinvest a small increment of capital without serious loss is chiefly due to the fact that the losses fall on the owners of other productive agents, including laborers.

I should add, however, that in so far as any single investment, negligible in size in comparison with the economic system of which it is a part, represents things consumed and reproduced in a regular cycle, the quantity of capital in that investment does bear a mathematical relation to the length of the cycle. In this connection, some of my previously published statements have been too sweeping, but the relation in question does not affect the argument just summarized.[1] Cyclical disinvestment literally has no meaning for any considerable fraction of the social capital, and even for the individual capital good it applies only to a limited extent. In considerable part, the individual good (physical or social-psychological) is permanent, either without maintenance or with maintenance which is not periodic, or its life is entirely unpredictable. The periodicity theory assumes that there is a simple, definite relation between maintenance and service life—which, of course, is untenable. On the other hand, the notion of periodic replacement creates a special maintenance problem only in the sense that the conversion of an irregular return or outlay into a uniform rate of flow requires an independently known rate of interest. The rate of interest can, however, be derived mathematically without assuming either an amount of capital as principal, or a given uniform income stream. We need only consider the instantaneous rate of growth of an income at the moment the owner begins to abstain from consumption and to invest instead. Reasoning on this line is easily shown to lead to the "force of interest," the relation of which to the effective rate of simple interest is expressed by the equation $\delta = \log_e (1+i)$.

[1] For light on the point I am indebted to the study of two articles by Mr. K. E. Boulding, now of the University of Edinburgh, in the *Quarterly Journal of Economics* ("The Application of the Pure Theory of Population Change to the Theory of Capital," August, 1934; "The Theory of a Single Investment," May, 1935). Mr. Boulding, however, expressly repudiates virtually all the theory developed on the basis of the time-period concept by Professor Hayek and the other neo-Austrians.

AMERICAN AND NORWEGIAN WHALING: A COMPARATIVE STUDY OF LABOR AND INDUSTRIAL ORGANIZATION

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MODERN Norwegian whaling, based upon Sven Foyn's invention of the bomb-harpoon shot from a gun, began in 1868 with the capture of thirty blue whales. From that date on the Norwegian industry rose unevenly but at times spectacularly toward its zenith in 1931, when 25,952 whales yielding 2,316,962 barrels of oil were harpooned. And from that same year, 1868, American whaling declined steadily and at times disastrously, with only an occasional brief reversal of the trend, until it dwindled to negligible proportions soon after the turn of the century.

What were the forces which thus enabled Old World whaling to rise phoenix-like out of the ashes of the New World industry? Why did New England surrender so casually to Norway her position of supremacy among the world's blubber hunters? Chiefly, it must be said, because she did not choose to fight, because her economic interests and activities were shifting into other and more profitable channels.

The development of petroleum, with its manifold uses and varied contributions to industrial progress, cut away the major demands for whaling illuminants and lubricants at the same time that the harpoon gun, the substitution of steam for sail and iron for wood, the exhaustion of the older whaling grounds, and the need for larger vessels and mechanized equipment were calling for a thorough technological reorganization of the industry. New England, however, was not disposed to provide the necessary capital for such a reorganization, because the prospects for profit were far greater in textiles, shoes, and other industries at home and in the exploitation of the magnificent natural resources of the West. New England man-power, too, was being weaned away from the sea by the siren call of the prairie. And so the law of comparative advantage gradually asserted itself; smaller oppor-

tunities were discarded in favor of greater ones, and finally even Buzzard's Bay and Long Island Sound lost interest in whaling. Vessels went on to shipwreck or depreciation, and crews to factory, farm, or idleness.

Meanwhile, however, the Norwegians, with a less promising hinterland and a stronger economic pull toward the sea, were experimenting with the new technology. Harpoon guns, firing stout barbs with bombs attached, were mounted in the bows of larger, faster vessels propelled by steam. These mechanical improvements made possible the pursuit and capture of the blue whale, largest and fastest of all whales, which the older boat-steerers, throwing harpoons by hand from oar-propelled boats, had never been able to touch. Newer and less exhausted whaling grounds were sought out, and newer uses for whale products were found in soap-making and in the treatment of leather, jute, flax, and certain woods, as well as in the development of high-grade lubricants, fertilizer, and bone-meal.

This modern Norwegian fishery reached its greatest development during and after the World War, whereas New England whaling was at its height during the two decades preceding the Civil War. The contrasts as well as the similarities afforded by these widely-separated periods of industrial flowering are always interesting, often significant, and at times illuminating.

By a curious coincidence, each period concentrated its commercial activities primarily upon four species of whales, with only the humpback, and that the least important in each instance, appearing in both groups. The Yankees preferred the sperm whale, the bowhead, and the right whale—the last a rather loosely classified and geographically widespread whale which should perhaps be divided into three or four separate species—while the Norwegians have favored the rorquals, including the magnificent blue whale, the fin whale, and the sei whale, though they do occasionally catch sperm and other whales as well.[1]

[1] The biological classification of whales has not yet assumed a precise and final form. For a detailed discussion of the various species which have been hunted, see the Presidential Address delivered at the anniversary meeting of the Linnaean Society of London, May 24, 1928, by Sir Sidney F. Harmer in *Proceedings of the Linnaean Society of London*. Session 140 (1927–28), pp. 53–70.

The avoidance of rorquals by the nineteenth-century whalemen was caused by a compound of desire and necessity. The sperm whales produce a higher grade of oil and the right whales longer and better whalebone than the rorquals, and their carcasses were less likely to be lost through sinking. But even more important was the fact that the rorquals were too fast to be approached and too dangerous to be attacked with the hand harpoon and the small boat.

Later, however, technological improvements and market conditions combined to turn the pursuit in the direction of the rorquals. Faster vessels equipped with harpoon guns rendered it relatively easy to catch the prey, and larger and stronger ships, to say nothing of the bombs timed to explode within the whales' vitals, made it unnecessary to fear either a gage of battle or the sinking of the carcass. At the same time the inferior quality of both oil and bone became less important, since the former was used in less exacting ways and the latter was converted mainly into bone-meal and guano (fertilizer). And most important of all, the rorquals contributed virtually a fresh and untouched source of supply, whereas the sperm and right whales had been hunted for many decades and either decimated or driven into less accessible grounds.

The older whaling grounds comprised more than a score of well-recognized regions, literally scattered all over the world, and including such areas as the waters in the vicinity of New Zealand, Japan, Spitzbergen, Kamchatka, Madagascar, Peru, various island groups in the Pacific, the Sea of Okhotsk, Behring Straits, and the Gulf of Mexico.[2]

The activities of the Norwegians, on the other hand, fall into two rather distinct periods, neither of which exhibits quite so much world-girdling diversity as the Yankee era. From 1868 to 1905 there was much groping about for more fertile fields. This constant searching took the whalers first to the coast of Norway, and then, in rough chronological order, to Iceland, to the Faroes, to Newfoundland, to Japan, to the Shetlands, the Hebrides, and

[2] For a detailed description of the older grounds and routes, see E. P. Hohman, *The American Whaleman* (New York, 1928), pp. 148–53.

the west coast of Ireland, and finally to Spitzbergen. None of these grounds was really satisfying, however, and when the rich and teeming areas of the Antarctic were opened up after 1905 the center of gravity of the industry shifted heavily and rapidly to these high latitudes. South Georgia, the South Shetlands, and the South Orkneys rapidly became centers of operations, and after the war pelagic or open-sea whaling was begun and the Ross Sea was invaded. This last is so far south that it constitutes virtually an invasion of the domain of the South Pole explorers. The fields exploited before 1905 have not been entirely abandoned, and sporadic and comparatively small-scale operations are still maintained at various points along the coasts of Africa, Spain, Australia, and South and North America; but the last great stronghold of the industry today lies in the Antarctic.[3]

This growing concentration in the Antarctic has aided the steamship, the cable, and the mechanization of the industry to shorten and to regularize the whaling voyages. Absences of three to four years spent in unremitting pursuit of a "full ship" are no longer known. Instead, there are seasonal operations, extending from the Antarctic spring to autumn (October or November to April or May), which usually give crews and vessels a respite of several weeks, at least, out of each year. Reasonable regularity, fairly definite destinations, and annual periods at home have replaced the uncertain, prolonged wanderings of the mid-century whalers.

In another respect, however, there is a striking analogy between the two fisheries. Both were strongly localized in a few relatively small, unimportant ports in which they dominated the entire economic life of the communities. Both avoided the great centers of shipping. Sandefjord, Tönsberg, and Larvik, clustered together in the Oslofjord, keep at a safe distance from Oslo, as New Bedford and Nantucket did from Boston, or New London and Sag Harbor from New York. Whaling, it would seem, is a jealous mistress demanding the single-minded devotion of her followers. In

[3] Descriptive classifications of the modern whaling grounds are contained in the *Register of the Whaling Fleet*, edited by the Whalers Mutual Insurance Association (Sandefjord, Norway, 1931); and in Sir Sidney F. Harmer, *Proceedings of the Linnaean Society of London*, Session 140 (1927–28), pp. 77–78.

each case, it is true, these small communities needed and took outside assistance. The New England ports furnished their own capital, but had to go abroad to round out their crews; the Oslofjord uses much British capital, but has no need for outside manpower. Nevertheless, both industries bore the indelible impress of their small home ports, giving them, paradoxically, a curious atmosphere of provincialism in spite of their far-flung activities.

But resemblances cease when we consider the technological and economic aspects of the two periods, for the Norwegians have made full use of the countless technical achievements of the intervening years. The typical Yankee whaling unit consisted of a small wooden vessel of two hundred to four hundred tons, manned by a crew of twenty-five or thirty hands, and carrying three or four whaleboats in which the game was actually pursued with oars as the motive power and hand harpoons and lances as the weapons. When whales were killed, the carcasses had to be laboriously towed back to the ship, where they were secured alongside until the blubber was peeled off, cut into "horse-pieces" and "bible leaves," and "tried out" in two small, open boilers erected on deck. The great bulk of the carcass was then cut adrift, a total loss except to sharks and sea birds.[4]

Modern methods and equipment afford a striking contrast. The hunting and killing of the prey is now carried on in so-called "catchers," strongly-built, steam-propelled little craft of one hundred to three hundred tons resembling tugboats and carrying a crew of about eleven men. The harpoon gun mounted in the bows, capable of firing a large harpoon with a line attached and carrying a bomb which explodes after penetrating the whale's vitals, usually makes short work of the victim, which is then towed either to a floating factory or to a land station for processing.

The floating factories are well named, for they are literally factories afloat. They are relatively large vessels, ranging from 3,000 or 4,000 tons to 13,000 or 14,000 tons, and each acting as a supply ship for a small flotilla of three to five catchers whose function it

[4] A detailed description of these processes may be found in Hohman, *op. cit.*, chap. viii.

is to provide the raw materials for the factory in the form of whale carcasses. In the newer and larger craft these carcasses are pulled up on deck, in spite of their great bulk,[5] through a specially-constructed opening in the stern. Once on deck, they are attacked with hand tools and power-driven machinery, rapidly dismembered, and consigned to open or pressure "cookers," where every ounce of oil is extracted and drained away into tanks. Not only the blubber but also the meat, tongue, and entrails are treated for many hours in the pressure boilers; and even the residue is later dried and converted into fertilizer. Thus a far more effective utilization of the carcass is attained than was possible with the earlier and more primitive equipment.

If the dead whales, after being inflated with air by a power-driven pump to prevent sinking, are towed to a land station instead of a floating try-works, they are subjected to the same essential processes. Here, however, the equipment is even larger and more elaborate. A large whaling station in the Antarctic is, in fact, an industrial plant of no mean proportions. Besides the wharves, jetties, flensing platform, try-works, and guano factory, there are oil tanks, guano and bone-meal warehouses, a machine shop, a cooperage, an electric light plant, and buildings for living quarters and the commissary department, which are sometimes called upon to care for a working force of three hundred to four hundred men. In some instances there is a cinema as well, and once there was a church with a resident pastor. (This last experi-

[5] Some concept of the size of the whales dealt with may be gained from the following tables. The compilations were made by Mr. Sigurd Risting, secretary of the Norwegian Whalers' Association, and are contained in his elaborate statistical monograph, *Whales and Whale Foetuses, Statistics of Catch and Measurements Collected from the Norwegian Whalers' Association, 1922–25*, reprinted by the Conseil Permanent International Pour L'Exploration de la Mer, a body closely affiliated with the League of Nations, but with headquarters in Copenhagen (see pp. 29–32).

CATCH OF WHALES IN THE SOUTHERN SEAS DURING THE SEASON 1924–25

Blue Whales		
Group 1 (up to 70 feet)	27.9%	
Group 2 (71–85 feet)	59.2%	
Group 3 (over 85 feet)	12.9%	100.0%
Fin Whales		
Group 1 (up to 55 feet)	4.24%	
Group 2 (56–65 feet)	37.36%	
Group 3 (over 65 feet)	58.40%	100.0%

ment, however, continued for only one season.) A single station with such equipment has a daily capacity of ten to fifteen whales, which, if of average size, will yield from 600 to 1,000 barrels of oil and from 50 to 60 tons of guano and bone-meal.

Such figures indicate, of course, that modern whaling cargoes are of vastly different proportions than those of the earlier era. Post-war whaling vessels, as a matter of fact, are really whale-oil tankers, with capacities ranging in many instances from 50,000 to 100,000 barrels, and at least two giants, the "Kosmos" and the "Sir James Clark Ross," exceed the latter figure.[6] By contrast, whenever a Yankee whaler returned to port with 3,000 barrels of oil she was considered phenomenally successful.

Such a comparison, however, is hardly fair, for in size and capacity the older vessels were more nearly analogous to the modern catchers. But even here there is a wide discrepancy caused partly by steam and gunpowder and partly by the fact that the catchers merely kill and deliver the whales to the factories, with no responsibility for extracting and storing the oil. Thus the average yield per catcher for 110 Norwegian craft during the season 1928–29 was 11,002 barrels, while in 1926–27 the average yield for 108 Norwegian catchers was 6,383 barrels.[7] On the other hand, in 1842 a fleet of 55 sperm whalers arrived with an average cargo of 2,108 barrels of oil and an average length of voyage of 41 months and 8 days, or roughly 600 barrels per year; whereas in 1846 the average cargo for 94 right whalers was 2,259 barrels of oil, with an average length of voyage of 30 months and 2 days, or about 904 barrels per year.[8]

In terms of the total annual catches, however, as distinct from the average cargoes, the differences up to the last decade were not as great as might be expected, because of the larger number of vessels engaged in the New England fishery. Throughout the

[6] See the *Register of the Whaling Fleet* (Sandefjord, Norway, 1931), pp. 42–43.

[7] Figures taken from *International Whaling Statistics*, II (Oslo, 1931), p. 46.

[8] Figures compiled from the annual reports of the *Whalemen's Shipping List*, the authoritative organ of the American whaling industry, which may be consulted in the New Bedford Free Public Library. These illustrative figures for both the Norwegian and American industries were chosen at random, but in each case for years within the general period of high productivity.

forties and fifties of the past century there were between 600 and 700 American whalers, bringing home annually some 300,000 to 400,000 barrels of oil. It was not until 1910 that the total modern catch, made in a much smaller number of larger vessels, approached these general proportions with a yield of 284,320 barrels, and not until 1925 that the million-barrel mark was reached. In 1931 the enormous total of 3,686,976 barrels was attained, but because of voluntary restriction due to the fear of failing supply this is not likely to be duplicated within the near future.[9]

From a business standpoint the element of risk is still a dominant characteristic of whaling, as it always has been. On the whole, however, the risks in recent times have been somewhat reduced, while the methods of dealing with them have been greatly improved. Larger, stronger, and faster ships propelled by steam rather than sails, more accurate charts and maps, wireless telegraphy, and the many other improvements of the twentieth century have reduced materially the physical risks of storm, stranding, and fire. Those which remain, considerably augmented by the dangers of pushing operations closer and closer to the South Pole, are met and spread out by means of insurance and incorporation. Modern insurance is sounder and stronger than that available to the American whalers, and incorporation is a more flexible device than the older one of selling fractional shares ranging from one-half to one thirty-second.

Business risk, evidenced primarily in fluctuations of prices and cargoes, has also been somewhat curtailed, though it is still thoroughly formidable. Price ranges are not quite so unpredictable, and variations in the cargoes of comparable vessels, as well as in total seasonal catches, are not quite so violent as in the earlier era. This curtailment, slight and unsatisfactory as it may seem to those actually bearing the remaining burden of risk, follows logically upon the heels of such factors as the more regular seasonal operations, the development of scientific research data, the greater flexibility of movement, the higher degree of mechanization, and the more rapid exchange of information through better means of communication.

[9] *International Whaling Statistics*, IV (Oslo, 1933), p. 34.

Some of the most striking contrasts between the two great eras of whaling activity, however, are to be found in the field of labor conditions. Relative to other contemporary occupations, it is true, the whaling crews of both periods present perhaps an equally unenviable position, for both rank distressingly low in such vital matters as hardship, monotony, danger, exhausting and disagreeable labor, isolation, risk, and long, unbroken absences from home. But absolutely there are many arresting differences, with the later period, as is to be expected, usually showing marked improvements.

This is particularly true in the sphere of working and living conditions. The typical "home" of the average American whaleman, often for an unbroken period of three to four years, was a small wooden sailing vessel of three hundred to four hundred tons, manned by a crew of twenty-five to thirty hands. Aside from the officers, who were usually New Englanders, these crews, after the first third of the nineteenth century, consisted of a polyglot mixture of races and nationalities drawn from all the waterfronts of the world. Picturesque they were, undoubtedly, but also reckless, irresponsible, ignorant, and unprincipled; and they were often driven with a degree of niggardliness, exploitation, and brutality seldom rivaled except by the "bucko mates" of certain contemporary merchant vessels. This combination of harsh and brutal discipline, close confinement for many weeks and months, monotony varied by occasional periods of danger, hard work, or hectic dissipation ashore, execrable food, and shamelessly crowded quarters, produced a psychological situation which may be imagined, but cannot be adequately described. Nor were the noteworthy exceptions sufficiently numerous to blur the essential outlines of the picture.

The typical modern Norwegian whaleman on a floating factory, on the other hand, is one of a crew of more than one hundred men and lives in a steam-propelled vessel of five thousand to ten thousand tons, or more. He is seldom on board for more than a seasonal voyage of eight or nine months without a spell at home; his food is qualitatively decent and quantitatively sufficient; his quarters are reasonably adequate, though far from large or

luxurious; discipline is definite and exacting, but comparatively impersonal and governed by laws and regulations designed in part, at least, for his protection; and if he is ill or injured there is usually a physician on board to care for him. The crew, in spite of its size, is surprisingly homogeneous, consisting almost entirely of Norwegians with a similar economic and cultural background—part seaman, part fisherman, part agricultural laborer, with a leavening of intelligence, decency, and self-respect.[10]

The possibilities for varied companionship and recreation afforded by such a crew, plus the shorter and more regular voyages, the greater variety and complexity of the mechanical organization, the more elaborate division of labor, and the increased amount of elbow-room on the larger vessel, make for a psychological state markedly less trying than that of the earlier crews. Compared to ordinary existence ashore, life on a modern whaler is still abnormally difficult, dangerous, and dirty; but compared to existence on the nineteenth-century whalers it provides striking evidence of progress.

It must be added that a modern whaleman may be assigned to a catcher or to a land station instead of to a floating factory. In the first case his quarters will be far more cramped and his companionship more limited, but he will have a floating factory or a land station as his base and will be able to return whenever desirable or necessary. If he goes to a land station, on the other hand, he will have much more freedom of movement and a somewhat greater variety of recreational possibilities than on shipboard, even though his station may be located on some inhospitable and uninhabited coast, such as that of South Georgia.

As in so many other industries, the increasing mechanization of whaling has brought a more elaborate division of labor. American whalers carried a not inconsiderable number of ranks, includ-

[10] These present-day Norwegian crews, in their composition and in the quality and uniformity of their human material, bear a close resemblance to the American crews of the earlier period extending up to about 1830. These earlier crews, made up of the "sturdy, intelligent, and comparatively virtuous yeomanry of New England," plus an occasional negro or Gay Head Indian, were also characterized by homogeneity and a certain close-knit provincialism. See H. T. Cheever, *The Whale and His Captors* (New York, 1850), p. 303.

ing master, mates, boat-steerers, cooper, carpenter, blacksmith, steward, cook, seamen, green hands, boys, and sometimes a ship-keeper. But modern operations have lengthened and modified this list materially. Besides the harpooner, engineers, firemen, and seamen on the catchers, a floating factory requires from twenty to twenty-five separate ratings, and a land station from twenty-five to thirty.[11]

Desertion, once the bane of every whaling captain, is no longer a problem, for both the desire and the opportunity to desert have been heavily reduced. The desire to desert, so strong at times as to become a seeming necessity, was formerly stimulated by the hard and monotonous conditions of shipboard life plus a brutal discipline under which certain individuals were often singled out for "hazing" or "working up"; and the temptation presented by the many charming South Sea islands frequented by the whalers was too strong to be resisted by the more reckless and lascivious hands. Today, by contrast, any serious desire to desert has been practically eliminated by the combination of better crews, shorter voyages, improved conditions, higher pay, and reasonable discipline; and even if the desire were present, it would be suicidal to gratify it in the Antarctic regions now most often frequented. It was one thing, and possibly delightful enough to some temperaments, to become a "beach-comber" at Tahiti or the Marquesas; it is quite another thing to live on the beach at South Georgia or the South Shetlands.

One of the greatest sources of discontent in the earlier fishery was the food, painfully limited in variety, inferior and coarse in quality, and often execrably prepared by an untrained and incompetent cook. The unvarying staples of the foremast hands consisted of "salt horse" or "salt junk" (salt beef or salt pork), hard tack, tea or coffee, and molasses in place of sugar for all sweetening purposes. Occasionally rice, beans, potatoes, or other vegetables were added, and at infrequent intervals fresh fruits or vegetables were purchased at ports of call for immediate consumption. Delicacies, seldom expected more than once a week, included "duff" (made by boiling flour, lard, and yeast in equal parts of fresh and salt

[11] See the wage-scale given below for a full list of these ratings.

water), "lobscouse" (made of hard bread and salt meat, sprinkled with pepper, chopped into pieces and boiled), and "dough-boys" (a kind of flour dumpling containing the flesh and bones of porpoises). The officers and boat-steerers, having separate messes, enjoyed a somewhat less monotonous diet, but in quality and palatability there was but scant improvement. The only real solace for such dietary shortcomings was found in tobacco, both chewing and smoking, of which great quantities were consumed.

Living quarters in the forecastle were, if anything, even worse than the food. One creditable author who had visited many of the principal prisons of the United States and who was also familiar with the conditions of whaling life insisted that the average prison cell was preferable to the average whaling forecastle with respect to ventilation, lighting, roominess, and possibility of privacy.[12] Such a statement becomes plausible when it is recalled that the forecastle was a low compartment below deck which followed the curve of the bows back for some sixteen to twenty-five feet. It was seldom as wide as it was long, and housed from twelve to twenty men with all their belongings; and a single small hole cut in the deck above was entrance, exit, and the only source of ventilation and daylight. Small wonder that it was sometimes as bad as this: "The forecastle was black and slimy with filth, very small, and as hot as an oven. It was filled with a compound of foul air, smoke, sea-chests, soap-kegs, greasy pans, tainted meat, Portuguese ruffians, and sea-sick Americans." "In wet weather, when most of the hands were below, cursing, smoking, singing, and spinning yarns, it was a perfect Bedlam . . . . so low that a full-grown person could not stand upright in it, and so wedged up with rubbish as to leave scarcely room for a foothold. It contained twelve small berths; and with fourteen chests in the little area around the ladder, seldom admitted of being cleaned."[13]

Such food and such quarters, added to exposure, hardship, intermittent periods of severe strain, broken sleep, and hectic dissipation ashore, naturally left an impression upon the health of the whalemen. Respiratory, pulmonary, and digestive disorders were

[12] Cheever, *op. cit.*, pp. 305–6.

[13] J. R. Browne, *Etchings of a Whaling Cruise* (London, 1846), pp. 24 and 43.

common, together with numerous fevers, dysentery, venereal disease, boils, sores and other skin diseases, nervous disorders, and last but not least, scurvy. Owing to their long periods at sea and the predominance of a heavy salt diet, whalemen were peculiarly susceptible to scurvy, and not until well into the nineteenth century did the use of lime juice, onions, potatoes, and other antiscorbutics bring this special scourge of the seaman under control.

Accidents constituted another serious threat to the whaleman's health and welfare. His occupational hazards were enormous. The constant risks of fire, storm, fog, shoal, and reef which beset every vessel at sea were greatly augmented for whalers because they were so often in strange and unfrequented seas, far from any possibility of succor. In cutting-in and trying-out it was necessary to handle razor-edged tools, boiling oil, heavy casks, and slippery blubber on pitching, rolling, oil-soaked decks. And when in actual pursuit of the game in the whaleboats anything might happen, from a "stove boat" and a mere ducking to contact with the murderous jaws or flukes of an "ugly" sperm whale, days or weeks of drifting in an open boat, or being dragged to a watery grave by the flying loop of a "foul line."

In spite of these long lists of diseases and wounds, American whalers never carried physicians or surgeons. The captains, no matter how small their knowledge or how crude their training, were both, ex officio. Medicine chests stocked with simple, staple drugs and medicines and paid for in part by contributions levied upon all members of the crew were found on all whalers, and the contents of these chests were prescribed and administered by the captain-physicians as seemed to them wise, with or without the aid of a book of directions for diagnosing symptoms. As surgeons the captains were at times forced to rise to the superhuman. Armed with instruments taken from the kitchen or the carpenter's kit and without anesthetics, they performed amputations and dealt with other ghastly wounds in a manner which can only be termed butchery, however necessary and well meant. The courage of the captain and the hardihood of the victim under such circumstances were but tragic substitutes for skill, training, and experience.

Even when ashore at the end of a voyage the whaleman was by no means free from dangers and risks. The crimp, the outfitter, the boarding-house master, the brothel-keeper, the grog-dispenser, and their runners, posed outwardly as his friends and allies, but in reality they all belonged to an organized and commercialized system of exploitation which cheated, defrauded, and injured him at every turn until his money was gone; when he was again started on another voyage, or thrown out to fend for himself. It was, of course, quite possible, even though difficult, to keep clear of these various entanglements. But to do so required a greater degree of will-power, self-denial, and thrifty foresight than most foremast hands possessed or desired in the first flush of pent-up emotions at the end of a long, exhausting voyage.

In these various matters pertaining to health and welfare the twentieth-century Norwegian whaleman enjoys conditions which are markedly superior to those surrounding his American forerunners. These improvements are due in large part to the general progress in many material aspects of life, to the recent growth of humanitarianism, and to the rise in standards of living. But they are also caused in part by the fact that whaling is no longer a sweated industry, wringing returns out of exploited crews whose labor cost was kept at an even lower level than their efficiency, and consequently the connection between efficient, well-handled, well-cared-for crews and adequate returns is more obvious and direct today than during the earlier era.

Food, subjected to refrigeration, canning, packaging, and better storage, is of higher quality and more varied; accommodations are larger, cleaner, better lighted, better ventilated, and better equipped; the dangers of the chase and the susceptibility to disease are far less in spite of the rigors of the Antarctic climate; accidents and sickness, when they do occur, are usually dealt with by competent physicians; and the organized system of exploitation on shore by shipping-masters and their allies has virtually disappeared.

Hours of work are still long and at times irregular, but the time-honored watch-and-watch system, with unlimited additional hours whenever required by circumstances, has been supplanted

in large part by a basic day with provision for overtime pay. Some companies, at least, have embodied the regulations governing working hours in written agreements. One such agreement, covering the workers at a land station on the coast of South Georgia for the season 1928–29, limited the basic working day to the period between 6:00 A.M. and 6:00 P.M., with the usual allowance for meals. Any work performed outside of these hours was to be reckoned as overtime and to be paid for at rates ranging from 1 *kroner* to 60 *øre* per hour, with an increase for labor performed on Sundays and holidays of 100 per cent. In computing this hourly overtime pay for labor performed on Sundays and holidays, the "working up" of five whales was reckoned as one-half of a day's work; of seven whales, as three-fourths of a day's work; and of more than seven whales as a full day's work. The crews of the whaling boats, or catchers, as well as watchmen, were to be exempted from all overtime provisions while on the whaling grounds, but on the voyage from Europe to South Georgia and return (requiring more than a month in each direction) all hands were to work only eight hours per day.[14]

Another company, operating in the Ross Sea and on other whaling grounds, granted substantially similar conditions to the crews of its floating factories. Rates of overtime pay were the same, but were modified by a proviso that the company might, if it chose, compensate night work with a corresponding amount of free time during the day rather than by extra compensation. Overtime rates, too, were to be increased by only 50 per cent, rather than by 100 per cent, for Sunday and holiday work.[15]

One of the most peculiar of the many unusual practices of New England whaling was the method of wage payment known as the "lay." The whaleman was not paid by the day, week, or month, nor was he allowed a certain sum for every barrel of oil or for every pound of bone captured. Instead, his earnings consisted of a

[14] These provisions have been taken from a printed agreement entered into by the Whaling Company "Vestfold" (*Hvalfangerselskapet "Vestfold"*) on the one hand and the Norwegian Seamen's and Firemen's Union and the Whaling Workers' Association (*Hvalarbeidernes Forening*) on the other.

[15] This agreement, also for the season 1928–29, was made with the same two groups of workers by the "Rosshavet" Company (*Hvalfangeraktieselskapet "Rosshavet"*).

specified fractional share, known as a lay, of the total net proceeds of a voyage. During the middle decades of the nineteenth century, the golden era of American whaling, this fraction ranged from 1/8 to 1/10 for a few favored captains to 1/250 for a young and inexperienced cabin boy. Between these two extremes there was at any given time an approximation toward a going rate for each of the various ranks on board a whaler, with the average experienced hand getting from 1/100 to 1/160.

Obviously the amount of earnings represented by a given lay could not be definitely calculated until the close of an entire voyage, which often extended over a period of forty to forty-eight months. The gross value of a cargo was computed at the current market price of the various qualities of oil and bone, and the net proceeds obtained by subtracting a series of charges which included pilotage, wharfage, gauging, coopering, and commissions for the sale and handling of the oil and bone. Each man's earnings then consisted of that fraction of this net sum which was specified in his lay.

But it did not follow that the whaleman actually received this sum in cash. For throughout all the slowly passing months of a voyage both captain and agents kept accounts showing all deductions, advances, and credits for each member of the crew, and, since there were no wages whatsoever, everyone was forced to live on allowances. The agents' debits included the sum advanced for the man's original outfit, secured just before sailing; interest on this sum; small charges for loading and unloading the vessel and for defraying the expenses of a medicine-chest; and, in some instances, special payments to a man's family or dependents. The captain's deductions comprised the slop-chest account (purchases made on credit from the ship's store), the cash advances, and a variety of special items, with interest on all sums. While not all individual accounts contained this full list of subtractions, the exigencies of seafaring life were such that virtually all hands were indebted to some extent. Their credits, on the other hand, were made up almost entirely of the lay, with perhaps a few dollars earned as a bounty for sighting whales and an occasional stray item of a special nature.

The final settlement with each man then consisted of closing

his cumulative account. Normally there was a balance in his favor, which was paid in cash. But it was not uncommon for a whaleman to find himself actually in debt to the owners of a vessel in which he had worked for a period of two to four years. Even if he were more fortunate, his total earnings before any subtractions would not average more than five to seven dollars per month, plus food and bunk space. These average earnings were so low that the poorest grade of contemporary unskilled labor ashore was earning from two to three times as much.[16]

Modern whaling hands, by contrast, work under a rather complicated system of wage determination which combines three methods of payment: a definite, guaranteed monthly wage; a bonus for each whale captured (if on a catcher) or for each barrel of oil taken (if on a floating factory or at a land station), as well as for each sack of guano or bone-meal where these by-products are handled; and special hourly wages for overtime work. Thus only the bonus is directly dependent upon the size of the catch. Monthly wages are definite, entirely independent of the amount and value of the cargo; and overtime earnings do not necessarily vary directly with the success of the seasonal operations, for a relatively small season's catch may have been secured largely within a few peak periods and so required a large amount of overtime, whereas a large cargo may have been acquired at a comparatively even pace and thus demanded less overtime.

The most strategic difference between this method of payment and the lay lies in the fact that modern earnings do not fluctuate as violently as the size and value of the cargoes, or as profits. The monthly wages give an element of partial stability to the whaleman's income which was entirely lacking under the earlier system. The Norwegian whaleman is at least partly in the position of the normal worker ashore, who receives his wages for the performance of certain stipulated kinds and amounts of labor, regardless of the financial success of the employer for whom he works. He is only partially an entrepreneur, in the sense that he

[16] For the detailed calculations on which these figures are based, see Hohman, *op. cit.*, chap. x. Part II of the same work contains a descriptive and analytical survey of the whole field of labor conditions in American whaling.

shares directly in the purely financial risks of the undertaking, as distinct from the assumption of physical risks and other forms of disutility; whereas the Yankee whaleman was a full-fledged risk-bearing entrepreneur, inasmuch as his earnings were dependent upon precisely the same factors as were profits, and fluctuated just as violently. Since, however, he had no voice in the determination of business policy, he was forced into the unenviable position of bearing the heaviest burden of the entrepreneurial function without enjoying its most important privilege. He helped to pay the piper, but he could not call the tune.

TABLE I

WAGES ON WHALEBOATS (CATCHERS)

Classificaton	Wages per Month	Bonus per Whale		
		Blue	Fin	Sei or Humpback
	kr.	*kr.*	*kr.*	*kr.*
Seamen	150	11	6	3
Firemen	145	10	5	3

The wage scale covering the employees of two whaling companies for the seasons 1927–28 and 1928–29, shown in Tables I and II, may serve to illustrate in detail the recent systems of wage payments.[17]

In addition to the various provisions relating to hours, wages, and overtime work, these whaling agreements covered other points as well. The monthly wages were to be payable from the

[17] This wage scale was taken from the printed *Overenskomst mellem Hvalfangerselskapet "Sydhavet" og hvalfangerselskapet "Norge" og Norsk Matros- og Fyrbøterunion og Hvalarbeidernes forening* (Agreement between the Whaling Company "Sydhavet" and the Whaling Company "Norge" and the Norwegian Seamen's and Firemen's Union and the Whaling Workers' Association). Certain other companies used scales which were practically identical with this. Where a large factory worked with five catchers instead of three, however, these bonus rates were reduced by 30–40 per cent; and wage scales for land stations included an additional bonus per sack of guano or bone-meal. Because of this complicated wage classification and the fluctuations in cargoes it is impossible to give adequate single figures for average annual earnings; but perhaps three thousand to four thousand *kroner* ($750 to $1,000) per man may be a suggestive amount.

time the vessel left home until its return to the home port, but persons who remained on the whaling grounds during the winter season were to be granted a 30 per cent increase while there. The crews of the catchers were to receive bonuses only for those species of whales specifically mentioned, and were to be sent home from any port of call after the end of actual hunting operations

TABLE II

WAGES ON FLOATING FACTORIES WITH THREE WHALEBOATS (CATCHERS)

Classification	Wages Per Month	Bonus Per Barrel	Overtime Per Hour
	kr.	*øre*	*kr.*
Carpenter	180	5½	1.00
Boatswain	180	5½	1.00
Seamen (able bodied)	145	3	.90
Seamen (ordinary)	100	2	.90
Green hand	55	1½	.65
Boy	40	1	.60
Donkeyman	160	4	1.00
Fireman	145	3	.90
Trimmer	95	2	.90
First blacksmith	195	6	1.00
Second blacksmith	140	4	1.00
Blacksmith's helper	80	1½	.80
Repairman	175	5½	1.00
Pressure cooker	165	5½	1.00
First blubber cooker	175	7½	1.00
Second blubber cooker	165	5½	1.00
First flenser	175	7½	1.00
Second flenser	135	5½	1.00
Blubber cutter	130	4	.90
Meat cutter (large pieces)	175	7½	1.00
Meat cutter (small pieces)	130	4	.90
Boiler filler	130	3	.90
Boiler "emptier"	135	3½	.90
Laborer over 20 years	120	3	.90
Laborer under 20 years	110	2	.90

if the company so elected. If a whaleman lost his effects through fire or shipwreck, he was to be reimbursed by the company in an amount not to exceed five hundred *kroner*. And the accredited officials of the Norwegian Seamen's and Firemen's Union, the negotiating organization for the crews, were to be allowed on board vessels in Norwegian ports whenever "the service and work on board ship" would not be "hindered thereby."

This process of collective bargaining reflects one of the most significant differences between nineteenth- and twentieth-century whaling. For many reasons, collective bargaining in the early fishery was almost unthinkable. American whaling was perhaps the least standardized industry in one of the most individualistic frontier countries in a laissez-faire world. Everything from the irresponsible, polyglot crews and the large element of pure chance in the hunt to the competitive philosophy of the owners and the whole spirit of the times, was opposed to collective action and standardized conditions.

Today, however, collective bargaining seems desirable, reasonable, and quite workable. Better conditions, caused in large part by the general material progress brought about by the later stages of the industrial revolution, have attracted better crews. This ability of the industry to raise the caliber of its working personnel has been strengthened, too, by the sterility of large areas of Norwegian soil and the consequent lack of opportunity on the land. Better and more efficient crews, in turn, have both demanded and justified further improvements in conditions, and have sought to replace individual bargaining by collective bargaining in order to protect and advance these conditions. And owners, dealing with comparatively responsible, intelligent workers and influenced by the general trend of the times towards collective bargaining, have relatively weaker incentives to prevent organized action on the part of their crews.

The differences between individualism and planned, collective action appear again in the methods of dealing with one of the industry's most vital problems—the progressive exhaustion of the whaling grounds. The law of diminishing returns—enemy of all mankind—pursues the whaleman with peculiar persistence and directness. He is constantly facing the question of whether or not to "kill the goose that lays the golden eggs." For whales reproduce so slowly that it is quite possible to deplete an entire species to the point where it may die out, or at least become unprofitable to hunt. The whole history of whaling, in fact, is one long record of whaling ground after whaling ground being discovered, overworked, exhausted, and abandoned for newer fields, with no

serious effort either to study the habits and potential numbers of the game or to guide, co-ordinate, or control the activities of the hunters.[18] Only in very recent years have scientific research and economic planning and control on an international scale been called into play. But it is already apparent that they both carry rich possibilities of usefulness to the industry; and in fact it is becoming more and more clear that their rapid extension and development may represent the only means of preventing modern whaling from meeting the same fate which befell its New England forerunner.

Many aspects of the life and habits of the whale are still unknown or imperfectly understood by biologist and whaleman alike. The large gaps in the Yankee whaleman's knowledge of his game have not been completely closed, by any means, but in recent years the aid of science has been enlisted in a determined effort to secure the biological information essential in the formation of a sound policy for controlling the manner and extent of the hunting operations. The importance of gathering and reporting exact and comprehensive data has been impressed upon all owners and captains, and the handling and interpretation of these data have been entrusted to a committee including a distinguished biologist, a prominent statistician, and the scholarly secretary of the Norwegian Whalers' Association, who had already made several investigations in the field of whaling statistics.[19]

This process of collecting and analyzing biological information on an extensive scale has contributed materially to a better understanding of the conditions which govern the numbers, habits, and yield of the several main species of whales. The places and times of breeding, the period of gestation, the migration habits, the

[18] For elaborate and detailed substantiation of this statement, see *International Whaling Statistics*, II (1931), and IV (1933); and Harmer, *The History of Whaling*, in *Proceedings of the Linnaean Society of London*, Session 140 (1927–28), pp. 51–95.

[19] This committee, which was appointed in 1929 by the Norwegian government as the result of a recommendation by the Whaling Committee of the International Council for the Study of the Sea, consists of Professor Johan Hjort, of the University of Oslo; Director Gunnar Jahn, of the Norwegian Statistical Central Bureau; and Mr. Sigurd Risting, secretary of the Norwegian Whalers' Association. Each year, beginning in 1930, the committee has published a report, entitled *International Whaling Statistics*, which presents in condensed form the results of all whaling observations throughout the world.

average size and yield of the animals captured on various grounds and at different times of the year, the sizes and ages of fetuses found in slaughtered females, the influence of food supplies which are affected by ocean currents and by the temperature, salinity, and depth of the water—these and other factors have all been explored as carefully as the still incomplete and often inconclusive nature of the material will permit.

The outstanding results emerging from these studies, tentative though they be in some instances, are both interesting and significant. Figures relating to the average size of the blue whale, largest of all living creatures, have been given above.[20] The largest specimen of this species ever recorded was 106 feet (33.27 meters) in length, while individuals of less than 40 feet are very rarely captured. Even at the moment of birth the blue whale fetus has attained an average length of about 26 feet! The period of gestation is approximately one year, and most matings seem to take place during the winter months (June, July, and August in the southern hemisphere), when the animals are in temperate waters. The average yield of oil for blue whales is 84–87 barrels; for fin whales, 32–43 barrels; for humpbacks, 33–34 barrels; and for sei whales, 14–15 barrels. The consistency of the proportions between these four species suggested the use of a consolidated unit of measurement known as a blue-whale unit, under which 1 blue whale = 2 fin whales = $2\frac{1}{2}$ humpbacks = 6 seis. Thus the average catch for the whole of the Southern Seas during the period 1925–26 was 84.5 barrels per blue-whale unit. Sperm whales are still captured occasionally, but are relatively unimportant.[21]

But biological investigations, after all, are only by-products of the whaling industry, which is concerned primarily with the size of cargoes and the price of oil. Consequently the vital problem was to use this information in such a way as to adjust the operations of the industry to the actual and potential yield of the whaling grounds. The necessity of preventing the short-sighted policy of unrestrained exploitation of the whaling stock, and the possible collapse of the fishery through failure of supply, pointed

[20] See footnote 5.

[21] All of these figures have been taken from Sigurd Risting's monograph, *op. cit.*

at once to the need of international co-operation and control. For in spite of the dominance of the Norwegian personnel and of British and Norwegian capital, several other nations were also carrying on half-hearted operations, and Norwegian restraint alone might simply result in enlarged activities by other groups.[22]

Out of this situation has grown a small network of organizations and activities for the development of research, planning, co-operation, and control in the conduct of whaling operations. The Permanent International Council for the Exploration of the Sea and the Committee for Whaling Statistics, appointed by the Norwegian government but functioning for the entire industry, are concerned primarily with research and the collection of data. A special so-called "tagging expedition" has been dispatched to the Antarctic with the sole object of shooting metal disks into as many whales as possible. These disks, when subsequently discovered in the bodies of captured animals and reported with the accompanying data regarding time, place, and circumstances, will lay the groundwork for a better understanding of the migrations and movements of the game. And most important of all, the League of Nations after several years of study by its Economic Committee and groups of experts drafted a convention for the regulation of whaling. Dated September 19, 1931, this convention, after slow and tedious progress toward final ratification by the requisite number of governments, is now on the verge of becoming a factor of outstanding importance in the affairs of the industry.

Its twenty-one articles provide for the regulation of many aspects of whaling operations, although it excludes toothed whales and the small-scale primitive hunting by the aborigines of certain coastal regions from its provisions. The killing of right whales is prohibited entirely, as well as the killing of calves, suckling

[22] In 1928–29, for instance, there were 41 companies in world-whaling, divided as follows: Norwegian, 25; British, 6; Argentine, 1; Chilean, 1; South African, 2; Danish, 2; American, 3; and Japanese, 1 (plus several isolated and negligible units). Operations were spread over sixteen far-flung whaling grounds, including six separate areas in the Antarctic, West Africa, the coast of Natal, the west coast of Norway, the Faroes and the Shetlands, Mexico, the coast of Chile, the west coast of North America, Japan, and pelagic whaling in the North Atlantic and Arctic. With only five exceptions, each company restricted its operations to a single ground. See *Register of the Whaling Fleet* (Sandefjord, 1931), pp. 52–53.

whales, and immature specimens of all other species of baleens, or whalebone whales. The whaling population is further protected by detailed requirements for making the fullest possible use of all carcasses, and by grading the bonus rates for the whaling crews in such a way as to emphasize the size and yield, rather than the mere number, of the animals captured. The convention is to apply to all the waters of the world, including territorial and national waters as well as the high seas. Detailed biological data, as well as statistical material relating to the number, species, and yield of all whales killed, are to be collected by all whalemen and to be reported to the International Bureau for Whaling Statistics at Oslo. And finally, each signatory nation agrees to assume re-

TABLE III*

SCOPE OF WORLD WHALING OPERATIONS

Seasons	Whales Captured	Oil Production	Shore Stations	Floating Factories	Catchers
1930–31.....	42,874	3,686,976	9	43	276
1931–32.....	12,797	915,842	7	8	97
1932–33.....	28,668	2,596,778	8	22	183

* Figures taken from *International Whaling Statistics*, Annual Reports for 1932, 1933, and 1934.

sponsibility for the enforcement of the provisions of the convention within its own jurisdiction.

Long before this convention could be put into effect, however, the Norwegian government, seriously alarmed over the double threat of over-exploitation of the whaling grounds and the heavy drop in the price of oil, took the unprecedented step of declaring a holiday for all of its nationals in the Antarctic throughout the season 1931–32. As a result of this dramatic decree, acquiesced in and scrupulously observed by the Norwegian companies, though not by those of any other country, the Norwegian catch fell from 2,316,962 barrels in 1930–31 to 28,590 barrels, all secured in the North Atlantic and Arctic, in 1931–32. The prohibition was removed, however, for the following year, and the net effect of such drastic action and the extent of Norwegian dominance in the industry are both interestingly reflected in the consolidated world-returns for three successive seasons, as shown in Table III.

This Norwegian holiday, the League convention, and the agencies for collecting biological and statistical data are the present-day methods of dealing with the vital problem which is as old as whaling, namely, the attempted stabilization of an industry which is subject in the short run to violent fluctuations and in the long run to an application of the law of diminishing returns so severe as to suggest ultimate extinction. Is stabilization under such circumstances attainable, or is it only a mirage, leading always to eventual disappointment?[23]

Obviously this question cannot be answered until the methods of economic control now being invoked have had a fair trial. In the meantime, however, it is instructive to compare these methods with those employed by American whaling in facing the same problem of exhausted whaling grounds. New England whalemen, living in the nineteenth century and naturally dominated by the *Zeitgeist* of that period, thought and acted in terms of individualism, laissez faire, unrestricted competition, and immediate self-interest. Twentieth-century Norwegian whalemen, on the other hand, somewhat in advance of their period, perhaps, are turning to international economic planning and control and a more enlightened, long-run type of self-interest.

After making full allowance for the many other important points of difference between the two groups, will the latter be more successful in stabilizing and saving its industry than was the former? Again it is too early to hazard a definite reply, but it would seem that the urgency of its danger, its extreme localization, and its geographical and commercial peculiarities might well combine to bring about in modern whaling a mechanism of international planning and control capable of delaying for some time, if not preventing permanently, the fate of virtual extinction which befell its American forerunner.

[23] Japan seems to provide one of the few illustrations of comparative stability over a reasonable number of years. For two decades, 1910–30, her annual catch, with only two or three exceptions, remained at a figure between 1,500 and 2,000 whales. This record, however, is probably not of great significance, for the industry is a small one at best; the Japanese, alone among important nations, consume whale meat as a food and thus provide an unusual market; and since 1930 the annual production has dropped to about 1,000 captures. See *International Whaling Statistics*, especially II (1931).

TRIANGULAR TRADE

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I. GENERAL TRADE POSITION IN RELATION TO COMMERCIAL POLICY OF THE UNITED STATES

SINCE the passage of the Trade Agreements Act of June 12, 1934,[1] an increased degree of control over tariffs has been vested in the executive branch of the government. This additional control is exercised through the negotiation of reciprocal trade agreements with foreign countries for a period of three years provided that, in compensation, foreign markets are made available and that reductions in tariff rates are limited to 50 per cent of existing rates.

Those responsible for the formulation of policy in trade-treaty negotiations have taken the position that the measure is one intended to promote trade recovery, and that to do this it is necessary that all channels of international trade be enlarged.[2] Contrary to recent European tariff-bargaining practice, which has frequently taken the form of obtaining special advantages in reciprocal agreements, the present policy of the United States is designed to reduce in every direction existing barriers to world-trade. Emphasis has been placed upon the fact that bilateral agreements containing special or preferential advantages tend only to divert trade from existing channels; as a result, trade gained in one direction frequently represents only a loss in other directions. To check complete adoption of the view that international trade is solely a matter of competitive advantage, the United States has declared for the generalization to third coun-

[1] H.R. 8687, 73d Congress, "An Amendment to the Tariff Act of 1930."

[2] The Department of State, *Press Releases*, Vol. XII, No. 288 (April 6, 1935), "Policy of the United States Concerning Generalization of Tariff Concessions" briefly presents the official statement of policy, and the subjoined "Letter from the President to the Secretary of the Treasury" illustrates a method of enforcement of the consideration involved in the unconditional most-favored-nation clause of commercial treaties.

tries of concessions made in bilateral trade agreements provided third countries generalize to the United States trade concessions contained in their treaties, or, more accurately, provided that third countries do not discriminate, whether by treaty or *otherwise*, against the trade of the United States.[3] In the past, a country has often benefited from unilateral generalization of its concessions by a second country with which a most-favored-nation treaty had never been concluded, although the first country did not similarly generalize its own concessions.[4]

With widespread generalization of concessions the restrictions surrounding world-trade are reduced in the degree in which concessions have been made. The tariff walls are universally and simultaneously lowered in contrast to the results of special advantage agreements which, by reducing barriers between two countries, increase relatively their barriers against all others. Since the policy of generalization precludes the exclusive enjoyment of the advantages of the concessions and since its purpose is to provide equality of treatment of trade, it is strongly opposed by those who are attracted to a policy of securing a competitively advantageous bargain. Even under trade negotiation with generalization of concessions, however, this latter policy can be served in some degree through limitation of concessions to reductions in rates on those items of which the original beneficiary of the concession is the principal source of supply.

A second reason, in the case of the United States, for urging in bilateral agreements the adoption of provisions designed to secure universal reduction of trade barriers is the nature of the present geographical distribution of our trade. Agreements containing compensatory special advantages tend toward a bilateral balanc-

[3] See the "Letter from the President to the Secretary of the Treasury," dated April 1, 1935, cited in note 2 above.

[4] For a recent very brief statement interpreting the unconditional most-favored-nation clause see Leo Pasvolsky, "Our Tariff Program Is Aimed at Barriers," *New York Times*, April 14, 1935. For more extended treatment see Jacob Viner, "The Most-Favored-Nation Clause," Svenska Handelsbanken *Index*, Vol. VI, No. 61 (January, 1931). For consideration of special problems involved see Richard Riedl, *Exceptions to the Most-Favored-Nation Treatment* (London, 1931) (report presented to the International Chamber of Commerce).

ing of imports and exports, and such a result, owing to the fact that our exports substantially exceed our imports, would involve a reduction in our total exports. It would be taking too hopeful a view to expect that sufficient concessions could be made to balance exports and imports by increasing imports to the level of exports, and even if such a result were probable there would have been a relative decline in exports. Moreover, not only does the volume of our exports exceed that of imports but an excess of exports obtains with many more countries than does an excess of imports.

In Europe, in contrast, France, Italy, and the United Kingdom, for example, have excesses of imports from almost all directions. For these countries policies tending to effect a bilateral balancing of trade appear to have the positive advantage of promoting an absolute increase in exports with the alternative result a decrease in imports. Either of these changes is not considered unsatisfactory in many quarters.

It is this fundamental difference in the trade of the United States and many European countries which accounts for the existence of many of the present contrary trade policies. For a more complete understanding of the extent to which there is basis for contrary policies it is necessary to consider all the aspects of international financial relations which lie beyond strictly bilateral trade. Although all that trade which is non-bilateral would seem to be triangular trade, more complete analysis will reveal that this first and general concept of triangular trade is quite misleading. To rely solely upon the argument that bilateralism should be resisted because one country having an unfavorable balance of trade in certain directions must necessarily have compensatory favorable balances in other directions, owing to the existence of roundabout or triangular trade, is by no means entirely supportable by appeal to available data. The complete explanation would require consideration of all "invisible" transactions.

In 1933, for the more important countries, the net balance in the invisible accounts available for the settlement of non-bilateral trade was almost exactly as large as the volume of non-bilateral trade which was offset by "trade" transactions. Further clari-

fication of this situation requires more detailed consideration of bilateral trade, triangular trade, and the relation to each of the invisible transactions.

II. TRIANGULARITY IN INTERNATIONAL TRADE

Triangular trade can be defined in terms either of the physical quantum or of the value of trade. The definition in physical terms is of primary significance to the shipping world; the definition in value terms, to the financial world. The United States Tariff Commission defines triangular trade as the "trade between three or more countries through which the balance of trade is equalized."[5] Under the more uncommon term "balance of shipping" reference is made to the triangular voyage as a means "by which shipmasters seek to avoid sailing in ballast."[6] After citing numerous examples of triangular routes used to balance shipping, it is indicated that some of the "laterals" in the illustrative triangular routes are completed in ballast so that the "examples show that not all 'triangular voyages' are strictly triangular. . . . . Some consist rather in a dispersion after reaching the first destination to third points to obtain a homeward cargo."[7] It will be found that, just as the balance of shipping is not always in balance, the trade in value terms is also very frequently not in balance. In relation to commercial policy the interest in triangular trade is almost entirely in value rather than shipping terms. Consequently triangularity in international trade in physical quantum terms is not further considered.

Bastable, in a reference to triangular trade, comments on the fact that exchange operations are not confined to dealings between two countries and points out that one country may discharge its trade debts to a second country by drafts drawn on trade credits in a third country; in illustration, he indicates that

[5] *Dictionary of Tariff Information*, United States Tariff Commission (Washington, 1924), p. 808.

[6] *Ibid.*, p. 49. It may be pointed out that triangularity of trade in physical terms, measured by comparing the proportion of the triangular trade to the total trade involved, may vary substantially from the triangularity in value terms.

[7] *Ibid.*, p. 49.

"the case just described is known as 'triangular trade.' "[8] According to Bastable, "the most familiar instance is the trade of (*a*) India and China, (*b*) the United States, and (*c*) England, which exactly illustrates our supposed case. . . . . Eastern countries have an excess of exports to the United States, and they again have a surplus of exports to England, the latter paying her debts to America by her exports to the East; or, to speak more accurately, America pays her debts to the East by bills drawn on London."[9] The example of Bastable, from the point of view of the

[8] C. F. Bastable, *Theory of International Trade* (4th ed., London, 1903), p. 94. The example immediately following above is used in the *Dictionary of Tariff Information* to illustrate its definition of triangular trade. Triangular trade in some instances is referred to in connection with foreign exchange problems. For example, Taussig uses the triangular trade between the United States, England, and Brazil, to illustrate how one country may clear through a second country balances payable to a third country. F. W. Taussig, *Principles of Economics* (3d ed.), Vol. I, p. 454.

[9] *Ibid.*, p. 94. Bastable makes a misstatement in the quotation given in which he first indicates that Eastern countries "have a surplus of exports to England," and then in the same sentence indicates that England pays her debts to America "by her exports to the East." This situation, corrected by the statement that "to speak more accurately, America pays her debts to the East by bills drawn on London," indicates a natural tendency to consider all excesses of exports or imports as triangular trade and to assume that the triangularity is closed within the three countries selected for illustration. If Eastern countries have an excess of exports to the United States; if the United States has an excess with England; and, if England exports an excess to the Eastern countries, then the trade is very strictly triangular. Normally, triangular trade is that trade which is not bilaterally balanced; it may, of course, be multiangular. In the example of Bastable the triangularity should be viewed from one trade point only, i.e., that of the United States which relies on its excess of exports to England to secure bills with which to pay for its excess of imports from the Eastern countries. E. S. Furniss (*Foreign Exchange* [New York, 1922], p. 37–38) in considering a comparable case, also closes his example of the triangular trade between the United Kingdom, Brazil, and the United States by pointing out that Brazil exports an excess to the United States; the latter exports an excess to the United Kingdom, which in turn exports an excess to Brazil. Not only are there very few cases of this type of "closed" triangularity in trade but, of the few cases which do exist, practically none possess any high degree of triangularity when measured quantitatively. In 1932, for example, Brazil had an export surplus with the United States of $51,000,000; the United States had an export surplus of $200,000,000 with the United Kingdom, but the export surplus of the United Kingdom with Brazil was only $2,000,000. In 1929, the figures were $67,000,000, $518,000,000 and $30,000,000 respectively.

Another writer has stated that ". . . . it is quite common that a considerable lack of balance arises from the existence of a kind of chain in international trading

United States, continues to be one of the most important examples of triangularity in the trade of the United States.

Triangular trade of one country, in its total trade relations with all others, may be defined as the summation of the amounts of trade with second countries which can be settled by recourse to trade with third countries. Triangular trade may be measured as the amount of trade balances which can be cleared in this manner. Triangular trade is to be measured by countries (or areas which may include several countries). Taking the world as a unit, there is, of course, no triangular trade, for world-exports equal world-imports and there are no third areas to give rise to triangularity.[10] Triangular trade as defined for one country is not limited by the trade relations between third countries; for example, if country A has an import surplus with country B and an export surplus with country C, triangular trade exists regardless of whether or not B has an import surplus in its trade with C. If B does have such an import surplus with C, then the trade is triangular for each country, but this condition of trade between B and C is not essential as far as triangularity of trade of A is concerned. Not only is triangular trade taken to include multiangular trade—B may have an export surplus with C but an import surplus with E and F—but one country may have triangular trade with two other countries neither of which necessarily has triangular trade. If A has an import surplus in its trade with B and an export surplus with C, then neither B nor C has

transactions. . . . ." (A. W. Flux, *Economic Principles* [2d ed., London, 1923], p. 117). A review of the data on world trade of leading countries fails to reveal that a very high proportion of their trade is made up of "closed" multiangular trade, which of course is included in triangular trade as the term is generally used.

[10] Normally recorded world-values of imports exceed export values, primarily because of differences in basis of export and import valuations; the balance, largely transportation costs, represents service imports. Were these transportation costs excluded so that the valuation of imports of one country would be the valuation of them as exports by the country of provenance, then total export and import values would be equal. For discussion of possible effects of transportation charges on the barter terms of trade, see F. W. Taussig, *International Trade* (New York, 1927), pp. 135–40; for consideration of difficulties in connection with the statistical measurement of the commodity balance of trade, see Jacob Viner, *Canada's Balance of International Indebtedness 1900–1913* (Harvard University Press, 1924), chap. ii.

triangular trade within the group if B has an export surplus with C.

In the *Review of World Trade for 1933* issued by the League of Nations,[11] "the active and passive balances in trade with individual countries offsetting each other" are taken to represent triangular trade "in a narrow sense," (that is, considering merchandise trade alone, and thus disregarding "invisible" items). The amount of bilateral trade is taken to be the sum of "imports and exports offsetting each other in bilateral trade," i.e., reciprocal trade. The *Review* points out that these two divisions, while mutually exclusive, are not, however, all-inclusive with respect to total trade, for they fail to include a third division of trade of a country, its merchandise balance offset not by trade but "by the balance of gold and invisible items, such as service and capital transactions," and this division "embodies elements of both bilateral and triangular trade, in a wider sense." Unless, as rarely happens, the total imports and exports of a given country are equal, there is a net balance of trade, active or passive, which is settled by the net balance of invisible imports or exports respectively. The trade balance, if settled by reciprocal (though unequal) invisible balances in part and in part by appropriate invisible balances with third countries, might under these conditions be regarded as consisting partially of triangular trade and partially of bilateral trade. However, confining the usage of the terms "triangular" and "bilateral" trade to their more narrow meanings is more in accordance with general understanding. The balance of trade may then be indicated either as the balance of trade (as it is in the League studies), or as trade settled by recourse to invisible balances or gold, i.e., by international account items which are excluded from the merchandise trade reckoning. In view of the growing importance of the invisible account items, this usage in connection with bilateral and triangular trade studies focuses attention upon the increasing importance of invisible transactions in the balance of all international transactions.

Triangular trade is regarded, then, as the merchandise trade in one direction which is settled by *merchandise* trade in another

[11] "The Tendency towards Bilateralism" (Geneva, 1934), pp. 65–69.

direction, while bilateral trade is *reciprocally* balanced merchandise trade, and the balance of trade is settled not by commodity trade but by invisibles. The trade of the United States in 1933 may be used to illustrate these trade divisions. In that year the United States in its trade with all countries had exports of $1,675,000,000 and imports of $1,450,000,000; the excess of exports, or balance of trade, was $225,000,000. The sum of export balances with all countries with which export balances obtained was $595,000,000; the sum of import balances with all remaining countries was $370,000,000. The total trade of $3,125,000,000 was divided into: (1) triangular trade amounting to $740,000,000 (the import balances of $370,000,000 plus an equal amount of export balances against which they could be debited); (2) trade settled by recourse to the invisible accounts, $225,000,000 (the balance of trade in this case *credited*, in the international reckoning, against charges growing out of invisible transactions such as tourist expenses, etc.); and (3) bilateral trade, which was reciprocally balanced, amounting to $2,160,000,000 (the sum of (*a*) total exports less export balances and (*b*) total imports less import balances).[12]

For the United States in 1933 the triangular trade with all countries was 24 per cent of total trade; since the trade settled by invisible accounts, i.e., the active balance of trade which was settled by the balance of invisible imports, was only 7 per cent of total trade, the triangular trade in the wider sense in which that term might be used was 31 per cent. The difference in this case is not substantial but for many other countries, as illustrated by

[12] Based on *Foreign Commerce and Navigation of the United States Calendar Year 1933*, United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, 1934, Table No. III, p. 2. These figures record trade with 111 trading areas; consolidation of a number of trading areas, e.g., including Hong Kong with China, reduces very slightly the volume of triangular trade. Greater consolidation is entirely supportable on logical grounds for, as an example, the figures given for 1933 include import balances of $54,000,000 with European countries. These balances are largely with smaller countries and are practically all due to their indirect imports of United States products which are credited to the country from which they were directly imported. The trade figures of all but a few of these fifteen countries record an excess of imports from the United States, as their figures are, in contrast, recorded on a basis of origin for the most part.

the United Kingdom and Brazil, the difference is very great. In 1932, the United Kingdom had, in a total trade of $3,745,000,000, only a very small amount of export balances with a very few countries and extremely large import balances with a great many countries. Her strictly triangular trade amounted to only about 5 per cent of total trade and only a small fraction of the total net excess of imports of $1,185,000,000. In the wider sense triangular trade was about 33 per cent of her total trade. On the other hand, Brazil, with a total trade in 1932 of $289,000,000 composed of exports of $181,000,000 and imports of $108,000,000, had, with the principal countries in her trade, active balances of $86,000,000 and import or passive balances of $13,000,000. Brazil's triangular trade was only 9 per cent of her total trade. In the wider sense of the term her triangular trade was also 33 per cent. In the case of Brazil the large export balances are used to pay for invisible imports; the United Kingdom, on the other hand, receives from all directions imports in payment of all types of invisible exports. Not many countries, however, have balances of trade as large in proportion to their total trade.

Since 1929 the bilateral trade of the world has been "about 70 per cent of total turnover . . . . and the percentage varies remarkably little from country to country."[13] In the same period the proportion of trade represented by the balance of trade has increased and the share of triangular trade has declined. In the *Review of World Trade* the data on the balance of trade, bilateral and triangular trade, based on about three-quarters of the world's trade, reveal distribution as shown in Table I.[14]

Stability of the proportion of world trade which may be regarded as bilaterally balanced is shown; triangular trade has steadily declined until in 1933 there was as much of world-trade balanced by invisible accounts as was balanced by strictly tri-

[13] *Review of World Trade*, 1933, p. 66.

[14] The trade is that of 22 countries with their principal import and export markets representing about 90 per cent of the trade of each of the countries and about 75 per cent of world trade on a gold basis; this trade is taken as world-trade although trade of the 22 countries with countries outside of the group (10 per cent of world trade) is not included nor is trade of non-group countries with each other included (about 15 per cent of total world-trade).

angular trade. Omitting trade reciprocally or bilaterally balanced, the settlement of all remaining trade, averaging almost 30 per cent of world-trade, has been achieved by resort to the invisible accounts and to the trade accounts. The proportions are shown in Table II.

TABLE I

DISTRIBUTION OF TRADE OF TWENTY-TWO COUNTRIES

	1929 Per Cent	1931 Per Cent	1932 Per Cent	1933 Per Cent
Bilateral trade	72.0	68.4	69.7	71.7
Balance of total trade	9.7	16.1	15.5	14.1
Triangular trade	18.3	15.5	14.8	14.2
Total	100.0	100.0	100.0	100.0

TABLE II

HOW NON-RECIPROCAL TRADE WAS BALANCED

	PERCENTAGE OF NON-RECIPROCAL TRADE:	
	Balanced by Trade Accounts	Balanced by Invisible Accounts
1929	65.4	34.6
1931	49.0	51.0
1932	48.8	51.2
1933	50.3	49.7

In the settlement of non-reciprocal trade by the net balance of invisible accounts (which offsets the balance of total trade) and by trade with third countries, respectively, the former has for three years been of equal quantitative importance with the latter. Consequently, bilateralism in trade policies impinges as much upon invisible transactions as it does upon triangular-trade transactions. The increased importance of the net balance of invisible items and gold may be indicated by consideration of the nature of the non-trade accounts. Omitting gold from the reckon-

ing,[15] the invisible accounts may, very roughly, be classified as either service accounts or capital accounts. To the extent that debt service is of importance, the balance of trade during the depression tends to be maintained in absolute terms and to be increased in relative terms. This conclusion is dependent, however, upon total debt service items predominating in the total of invisible accounts; their importance varies greatly between countries of payment and receipt, and, of course, if reinvestment takes place, they are offset to that extent in the balance of payments. Since debt service obviously cannot be maintained out of reciprocal trade, its maintenance increases the balance of trade and reduces the proportion of triangular trade. Contrariwise, when capital lending is taking place, triangular trade tends to be enlarged. Finally, before considering the trends and directions of the principal channels of triangular trade, attention may be directed toward the conclusions of the League *Review of World Trade* on the effects of bilateralism and its partial elimination of triangular trade. Countries with passive balances "have often deprived themselves of part of the income from their foreign investments or from services rendered, of which income their import surplus is an expression."[16] Were two-party compensation agreements designed primarily to protect or enlarge the balance of trade for debt service, they then would operate to eliminate bilateral trade.[17]

Data on triangular trade reveal changes of consequence in the position of various countries; in Table III, triangular trade, in the narrow sense, is expressed as a percentage of total trade. Since the balance of trade is also given, the amount of triangular trade,

[15] Gold as a balancing factor against a surplus of merchandise exports was of primary importance in 1934 only in the case of the United States. Other countries importing substantial amounts of gold were largely importers, on balance, of merchandise; as a balancing factor against a surplus of merchandise imports, gold was of primary importance only in the case of South Africa. Other producing or dishoarding countries were, on balance, also largely exporters of merchandise.

[16] P. 67.

[17] The immediate effect of many recent agreements of this type has, however, been quite the opposite, largely due to their immediate tendency to release trade restraints.

in the wider sense, can easily be calculated, as it is the sum of triangular trade, in the narrow sense, and the balance of trade; all remaining trade represents bilateral trade. As a matter of collateral interest, the nature of the balance of trade is indicated by

TABLE III

TRIANGULAR TRADE (IN THE NARROW SENSE) AND BALANCE OF TRADE—AS PERCENTAGES OF TOTAL TRADE

Note: Triangular trade in the wider sense is represented by the sum of these percentages for a given country in a given year.

Country	1932		1929		1926		1913	
	Triangular Trade	Balance of Trade	Triangular Trade	Balance of Trade	Triangular Trade	Balance of Trade	Triangular Trade	Balance of Trade
British Malaya*	43.6	− 3.4	45.1	+ 1.9	57.7	+12.0	.....	.....
Denmark	35.0	+ 6.8	44.2	+ 1.6	47.4	− 3.3	34.1	− 8.5
Sweden	29.0	− 1.1	25.5	− 0.2	24.1	− 2.4	17.0	− 1.8
Canada	26.2	+ 3.4	21.8	− 5.8	21.7‖	+ 9.7‖	25.6‖	− 2.9‖
Argentina	23.6	+23.2	26.6	+ 5.6	.....	− 2.0	25.8	+ 2.3
British India	21.8	− 0.7	22.3	+ 9.3	23.7‖	+13.1‖	32.7	+14.1
Japan	21.3	− 0.6	24.8	− 0.9	20.4	− 9.2	41.0	− 7.3
Egypt	20.6	+ 5.4	25.2	+ 3.6	27.2	−11.3	23.8	+ 6.4
Netherlands East Indies	19.7	+19.1	41.1	+30.7	4.2	+37.1	16.6	+16.8
Australia†	19.4	+26.0	33.2	− 2.0	26.8§	− 2.1§	21.8	− 2.9
Germany	19.1	+14.4	23.1	+ 1.7	24.7	− 1.1	23.1	− 3.2
Belgium	18.6	− 6.1	15.0	− 8.0	7.4‡	−12.3‡	9.3	−12.2
Czechoslovakia	17.4	− 7.2	23.9	+ 0.1	28.8	+ 7.8	.....	.....
United States	16.8	+13.9	21.4	+10.0	29.1	+ 4.1	20.0¶	+12.4¶
Union of South Africa	14.0	−26.5	12.1	−26.6	30.7	− 2.3	10.5	+20.9
Netherlands	9.9	− 0.6	11.3	−14.3	15.6	−16.5	.....	−11.6
Brazil	9.0	+25.2	24.1	+ 4.5	26.2	+ 8.2	30.0	− 1.3
China	6.4	−36.8	15.2	−11.6	16.3	−18.6	15.4	−13.9
France	6.1	−19.0	23.5	− 6.9	26.4	− 0.1	20.3	−10.1
Italy	5.9	−10.5	6.2	−21.0	4.0	−16.2	6.9	−18.4
United Kingdom	5.2	−27.2	4.8	−20.1	6.7	−26.3	11.6	−11.3
Switzerland	2.4	−38.2	11.6	−16.1	17.4	−12.7	.....	−15.1

* 1931 figures for 1932.
† Year ended June 30.
‡ 1924.
§ 1925.
‖ Year ended March 31, of year subsequent to date given.
¶ 1910–14 average.

(+), if active, and by (−), if passive, indicating which countries on balance are net importers of merchandise and which countries are net exporters.[18]

[18] Figures for 1932 and 1929, in Table III, are taken from *Review of World Trade*, p. 67, except for Australia, Brazil, British Malaya, Netherlands East Indies, Union of South Africa, and China, for which the figures have been calculated independently

On the whole, the volume of strictly triangular trade was substantially maintained through the period from 1913 to 1929; persistent decline did not take place until after 1929. Over the entire period, however, decreases have been numerically greater than increases, and only Canada, Sweden, and Belgium have steadily increased their proportions of triangular trade; these three countries uniformly have comparatively small balances of trade and that of Belgium has been decreasing. In contrast, substantial decreases in triangular trade have occurred in the case of Czechoslovakia, Netherlands, Brazil, China, France, South Africa (since 1926), Egypt, Germany, and India. British Malaya, Denmark, Argentina, and Japan have maintained substantial proportions of triangular trade.

During the period, Argentina, Australia, Germany, and Brazil have increased the proportion of their total trade represented by their balances of trade which were, in 1932, favorable balances; all these are debtor countries. In addition to these four, Netherlands East Indies and the United States have maintained substantial favorable balances of trade. The five countries at the bottom of the list in 1932 with respect to triangular trade, without exception, have substantial adverse trade balances and have had such balances throughout the period reviewed.

Turning more specifically to the position of various countries with respect to the proportion of their balances of trade to total trade, in relatively few instances have marked changes occurred; India's earlier favorable balances of trade have disappeared; Netherlands' substantial unfavorable balances have also disappeared; and, South Africa's earlier favorable balance has become a substantial adverse balance. The position of Netherlands East Indies has remained constant with heavy active balances in all years, and with the high proportion of 37 per cent of its trade in 1926 represented by excesses of exports which prevailed in

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in order that adequate distribution, outside of Europe, might be given. The sources for these calculations are: *Foreign Commerce Yearbook 1933*, U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington (1934), for 1932 and 1929, and *Commerce Yearbook* (Volume II for 1926 and 1927) for data for the years 1926 and 1913.

practically every direction, owing in large part to the very high price of rubber in that year. On the whole, it is apparent that the debtor countries have maintained the proportion of their active balances to their total trade and that the creditor countries have increased their adverse balances. This increase in the adverse balances of the creditor countries is probably accounted for by increased commodity imports which are offset by increased invisible exports.

It is of interest to inquire into the principal flows of trade which are representative of, and of major importance in, triangularity of world-trade. Bastable's illustration, earlier referred to, continues as an outstanding case of triangular trade, for in 1933 the United States had its largest surplus of imports with Asia and its largest export surplus with Europe.[19] This triangular trade for the United States was about three-fifths of its total triangular trade. The only other direction from which an excess of imports prevailed was with South America. The excess of exports to Europe alone exceeded these surplus imports; additional export surpluses obtained in all other directions. If the trade with Puerto Rico and Hawaii were included in official trade figures,

[19] This triangularity is rapidly disappearing with the decline in the import surplus of the United States from Asia due in very large part to the decline in the value of imports from Japan (primarily silk) and the increase in the value of exports to Japan (primarily cotton). The following table gives trade of the United States with Asia and Japan in recent years.

	In Millions of Dollars			
	United States Exports to:		United States Imports from:	
	Asia	Japan	Asia	Japan
1929	643.2	259.1	1,280.3	431.9
1930	448.0	164.6	856.5	279.0
1931	386.4	155.7	574.3	206.3
1932	292.1	134.5	362.5	134.0
1933	292.3	143.4	425.9	128.4
1934	401.3	210.4	489.8	119.3

In 1929, the United States exported to Japan about 1,100,000 bales of cotton valued at $110,000,000; in 1934, 1,750,000 bales valued at $112,000,000. In 1929 the United States imported from Japan about 70,000,000 pounds of silk valued at $360,000,000; in 1934, 50,000,000 pounds valued at about $65,000,000. In this exchange of cotton for silk the value of silk fell by 60 per cent on a unit basis.

there would be revealed substantial import surpluses from these areas, fairly comparable with the trade with the Philippines which is included in the trade totals of the United States. The triangular trade of the United States with the West Indies (including Cuba) and England continues as in Colonial days with the imports of sugar, molasses, and, once again, rum from Cuba and the exports of cotton and tobacco (as well as many other products) to England. The United States now has, however, an export surplus to the British West Indies. With England, Cuba continues to maintain an import surplus of "manufactures." The development of production of sugar in Hawaii and the Philippines has reduced the amount of the West Indian triangular trade, but its character has not changed from that of Colonial times.[20]

A brief survey of the trade of the United States with those countries from which it purchases more than it sells reveals that only in two instances do such countries purchase from all other countries (other than the United States) more than they in turn sell to them. These are Ceylon and British Malaya; in these two instances, although involving arbitrary imputation, it might be said that the United States provided purchasing power which permitted an excess of purchases from other directions. The trade with Ceylon is not large; in the case of Malaya, the United States' import surplus was about $32,000,000, and Malaya's total import surplus from all other countries was about $16,000,000. The United States in 1932 also had import surpluses with Cuba, Colombia, Venezuela, Chile, India, and Netherlands East Indies, and the trade was substantial; all of these countries, however, had export surpluses in their trade with all other countries.

If we turn to countries with which the United States has a net export balance, and take as examples Belgium, France, Germany,

[20] In 1932, Cuba had an export surplus of $30,000,000 in trade with the United States compared with $83,000,000 in 1926 and $56,000,000 in 1913. The surplus of imports of the United States from the Philippines alone, in 1932, was $36,000,000 and $35,000,000 in 1926; from 1910 to 1915, the United States had an export surplus in its trade with the Philippines. The trade with Hawaii is slightly larger than that with the Philippines but the import surplus is slightly less. Puerto Rican trade is entirely comparable in character and only slightly smaller in volume. Only trade with the Philippines (and of course Cuba) is now included in the United States figures of foreign commerce.

Italy, Netherlands, Switzerland, Denmark, and the United Kingdom, a study of the trade of these countries reveals that they in turn have export surpluses in very few directions except with other countries in Europe. Consequently, it is not the rule that their payments to the United States can be offset by a net balance of export receipts in other directions, for, except in the case of Germany and Denmark, their export surpluses are most infrequent, and when they do occur they are never of great importance. Germany's export surpluses were largely with other European countries, and Denmark's export surplus was almost entirely with the United Kingdom. In brief, European countries taken collectively have a net balance of imports from almost every direction.

To ascertain the existence of triangular trade which is strictly trilateral, the trade of the United Kingdom, France, and Italy may be reviewed in another way. These countries, as already indicated, import from the United States on balance, but in turn export on balance in few directions. Consequently, it can hardly be said as a general rule that their exports were paid for by credits which third countries derived from the United States. Aside from its small export balance with Brazil, the United Kingdom also exports on balance only to India and the Straits Settlements; in both instances, the amount of trade involved is not large. France and Italy have export balances with five countries with which the United States has import balances, but, with the possible exception of their balances with Egypt, these balances of France and Italy can probably be entirely accounted for by re-exports of goods of United States origin. The final instances of closed triangularity, involving trade of the United States, are with the Philippines, Hawaii, and Puerto Rico; each of these areas exports, on balance, to the United States and imports (a substantially smaller amount) on balance from all other countries.

The position of Canada in her trade with the world is quite comparable with that of the United States, for, except for her excess of imports from us, her trade consists of heavy export balances with the same countries with which we have export balances. Her import balances from tropical areas are not, however, as important due to the fact that the products from such

areas are, in many cases, imported via the United States. This situation underlies her present policy of granting preferential tariff rates for certain products which are shipped to her *directly* from certain countries south of the United States.

The conclusion is therefore reached that while triangular trade (defined as the trade import balances of one country with second countries which can be canceled by resort to trade export balances with third countries) is substantial for the United States, an approach to balance with individual second and third countries obtains so infrequently that "matching of the trade" can seldom be satisfactorily imputed. Of more significance is the fact that the closed type of triangular trade, as the term tends to be illustrated in historical cases, seldom exists in a degree quantitatively important in *value* terms.

To sketch the principal cases of triangularity in world trade, the trade of the following areas has been reviewed.[21]

1. United States—trade with all areas.
2. Canada—trade with all areas.
3. South America—represented by Argentina, Brazil, Chile, Colombia, and Venezuela, which account for over 85 per cent of the world-trade of all countries in South America.
4. Europe—represented by Belgium, France, Germany, Italy, Netherlands, and the United Kingdom, which account for over 70 per cent of the world-trade of all countries in Europe.
5. Asia—represented by British India, British Malaya, Netherlands East Indies, China, and Japan, which account for about 70 per cent of the world-trade of Asia.
6. Oceania—represented by Australia and New Zealand which account for over 90 per cent of the world-trade of Oceania.
7. Africa—represented by Algeria, Egypt, and the Union of South Africa which account for over 50 per cent of the world-trade of Africa.

[21] The data upon which is based the summary of world triangular trade given below contain certain discrepancies. The exports of one country to another become imports of the latter from the former and substantial differences exist in these reciprocal figures. These discrepancies result in part (outstandingly in the case of European countries) from the fact that import valuations by the importing country include cost, insurance, and freight, which is not added to the export value by the country of export, and, in part, from the fact that exports of one country may be recorded according to their shipping destination, while upon importation by the country ultimately importing them for consumption, they are credited to the coun-

These areas, as defined, collectively represented, in 1929 and 1932, approximately 75 per cent of world-trade. The trade of the countries included in each area has been consolidated and the trade of all other countries *inter se* has been excluded.

The data on trade balances were arranged to include the net balances of trade of each area with all countries outside of the group so that all of the trade of the countries reviewed was considered.

The principal triangular trade channels for each of the areas, in the order given, can be summarized as follows:

1. The United States imports on balance from South America and Asia and exports on balance in all other directions. In South America the only important exception is the prevailing export balance with Argentina. The import surplus with Asia has rapidly declined since 1929 owing in large part to the fact that by 1932 there was a reduction of almost $1,000,000,000 in the cost of imports—largely from Asia—of silk, rubber, vegetable oils and oilseeds (except flaxseed), hides, burlap, tin, tea, and wool. The decline in the cost of these imports was almost 80 per cent; the quantities taken decreased roughly by about 40 per cent; the price decline was about 65 per cent. Imports of coffee, petroleum, copper, fertilizers, and flaxseed—largely from South America—decreased about $500,000,000. Except for coffee, the decline in quantities imported from South America was substantial; but there is probably no important sector of trade in the world which has decreased as much in total value as has the trade of Southeastern Asia with the United States.

2. Canada's only substantial import balance exists in her trade with the United States; export balances are obtained in all other directions and are especially large in the trade with Europe. Since 1929, the import balance with the United States has declined much more rapidly than the export balances with Europe

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try of origin. In addition exports of one country in a given year may not be registered in import figures until the following year. Since the purpose of the data is to reveal the directions of principal world triangular-trade "flows," no attempt was made to reconcile or equalize these differences which, as a rule, are not large.

owing in large part to the cessation of her capital imports from the United States and the fixed nature of her debt service, which is payable both in New York and London and which is paid largely with sterling funds.[22]

3. South America as a whole has a very substantial export balance with Europe and with the United States and very small import balances. This position obtained, in detail, for all countries except Argentina, which imports on balance from the United States but exports to Europe much more heavily, relatively, than other South American countries. Brazil, Colombia, and Venezuela export on balance, in large amount, to the United States and import from Europe.

4. Europe imports on balance from every direction except Africa, with which a nominal export balance is obtained. A detailed analysis of the large trade of Europe with Asia reveals that that trade is relatively closer to a balance than any other equal volume of trade; in fact, were deduction made for the freight charges, insurance and other items which are included in the recorded or landed value of the imports from Asia, there would probably be revealed a slight export surplus to Asia. In any event, the Asiatic market continues, for Europe, as the one large market in which it sells in very high proportion to its purchases.

5. Asia's large trade, primarily with the United States and Europe, during the depression has changed from one containing an export balance to one involving an import balance; this has been caused largely by price declines and the triangular trade existing in 1929 has as a result almost disappeared.

6. Oceania, comprising Australia and New Zealand, continues to maintain a high proportion of triangular trade, with import balances from the United States and Canada and heavy export balances with Europe, particularly with the United Kingdom.

7. Africa is without triangular trade, having an import surplus from all directions.

[22] For the relation of capital movements and the triangular trade of Canada, see Viner, *Canada's Balance of International Indebtedness, 1900–1913*, chap. xii, "Triangular Adjustment of the Balance of Indebtedness."

III. CONCLUSIONS

While this survey of triangular trade has indicated in trade terms its nature, its method of measurement, and its principal channels, there has been revealed, briefly, the growth in importance of the invisible accounts to a position fully commensurate, on the average, with that of the trade accounts in the settlement of the sum total of a country's trade balances with all other countries. In the case of the United States, for example, in 1929 and 1932 its import surpluses (which of course do not include offsetting export balances) with countries with which such surpluses existed were less than its net balance of trade which was settled, of course, by the net balance in the invisible accounts. This situation did not obtain in 1933, but it was restored in 1934 when import surpluses were $390,000,000 and the balance of trade was $480,000,000.[23]

There is, moreover, in the sum of all international financial transactions, if reciprocally cancelable trade is excluded, probably as great a proportion of non-trade transactions as of trade transactions. It should be pointed out, however, that both reciprocity and triangularity exist in invisible transactions as well as in trade transactions. This is clear from the statement that it is the net balance in the invisible accounts (gold included) which cancels the net balance in the trade accounts. The importance of this net balance in the case of the United States is illustrated by the substantial excess of the net balance of the service accounts alone (excluding from service accounts all capital, interest, and dividend accounts) over the balance of trade accounts in each year from 1925 through 1933.[24]

Stated in another way it may be said that the American opposition to bilateralism in trade policy may be based even more on the volume of our invisible imports than upon the volume of our

[23] The figures for 1933 have been given above. In that year as compared with 1929, 1932, and 1934, import surpluses gained substantially relative to the balance of trade owing, of course, to the failure of export surpluses to increase simultaneously; in the third quarter of 1933 the total trade of the United States revealed an import surplus for the first time for that quarter in many years.

[24] *Report of the Commission of Inquiry into National Policy in International Economic Relations* (University of Minnesota Press, 1934), p. 137.

triangular trade. At the present time there is not available, however, the detailed data necessary to determine, with respect to each country, the degree of reciprocity in the combined visible and invisible accounts. The net volume of purchasing power which the United States supplies to all other countries in the payments made for our net balance of invisible imports normally exceeds the volume of purchasing power which we provide, in payment for our excesses of merchandise imports, to those countries with which we have such import excesses. For many other countries it is probable that the quantity of exchange involved in all non-trade transactions probably exceeds the quantity of exchange involved in all trade transactions if the latter quantity is taken to be only that exchange which is available after strictly bilateral trade has been cleared or after the exchange represented by it has been canceled.

For a given country the basic problem in the maintenance of balance in all its international accounts is the problem of maintaining desirable proportionality between *all* of the items which are recorded in its complete balance of international payments. No economy can maintain external equilibrium during periods of sudden and substantial changes in any of the important items involved in the maintenance of that equilibrium.

UNLIMITED LIABILITY IN EARLY AMERICAN CORPORATIONS

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IN A period when the perennial problem of control over corporations has received renewed attention, an earlier era of state regulation deserves to be recalled. For practically a half-century after the adoption of the Constitution, the individual American states were jealous of their sovereign right to create corporate bodies, and insisted[1] upon examining each application upon its merits. In so doing they were simply continuing the distinction drawn by English law between enterprises of a quasi-public status, of direct benefit to national welfare, and those of a purely private profit-making character. The former group were thought to deserve charter privileges because in some special direction they would attempt to advance public welfare or the interests of the state. Colonization, the conduct of foreign trade, and the mining of metals valuable in war were such objectives in the sixteenth and seventeenth centuries; banks, turnpikes, canals, and to a lesser degree insurance companies entered this category in the eighteenth century.

But the cleavage between the two groups became more and more vague in America after 1800, and purely private enterprises[2] began to receive the sought-after privileges from the newly

[1] That bribery or political bargaining frequently rendered the process perfunctory did not alter its fundamental nature.

[2] It seems to be little realized that unincorporated private business associations of the eighteenth century, although barred from the legal status of corporations, approximated the business status and character of the modern corporation, both in England and in this country. The generation preceding the Bubble Act had witnessed a temporary breakdown in the rigid legislative view that charters should only be granted to quasi-public or "patriotic" undertakings; that act was essentially a reassertion of the government's right to exclude from the legal privileges of the corporation undertakings which did not measure up to this standard. Cf. Holdsworth, *History of English Law*, VIII (London, 1925), 215–19. As a result there grew up in the business world *de facto* corporations, direct forerunners of the modern ordinary corporation. They were formed privately, by articles of agreement which in content duplicated the legislative charters of the period so far as possible. They were

independent states. Up to 1830 there was a conflict, inevitably, between opposed points of view. Those favoring the liberal grant of charters to almost any petitioning group argued that such a course would stimulate industry[3] and economic progress. The charters of the Beverly Cotton Manufactory in 1788, of the Society for Useful Manufactures in 1791, and of the Manufacturing Societies in several cities illustrate the early inroads of this mode of thought upon the old theory of charter-granting. But the defenders of the charter as a gift not to be lightly bestowed held their ground. In the first thirty years of the nineteenth century, this attitude led to extremely interesting results, particularly in the two states which had most to do with charter grants. Charters were granted with relative frequency, but as concessions to the group which regarded the purpose in most instances to be a purely private one they were made subject to severe restraints or modifications. Regulation and restraint took the form of remov-

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not true partnerships, as the law for a century persisted in regarding them, for they had abandoned every characteristic which in a business sense distinguishes partnership organization, except unlimited shareholders' liability. They became numerous in England by 1760; in this country they appeared most notably in the field of land speculation.

Their healthy existence alongside chartered bodies finally brought from legislatures recognition of the widespread desire to utilize in fact, if not in the eyes of the law, the corporate form. The capitulation of Parliament to this new conception of corporations culminated in 1855; in this country our general incorporation laws consummated the change. These business units, and not the old chartered bodies of the sixteenth and seventeenth centuries, are thus the direct progenitors of the business corporation of today, which is formed as they were by private initiative and possesses a purely perfunctory and automatic legal approval. The joint-stock association of American law is the survival of these bodies, which "captured" the legal corporation over here as well as in England. The treatment of the private groups who had the temerity to seek charters before this legislative shift in attitude took place is here to be examined. The work of the Foundation for Legal History at Columbia University throws much light on this evolution, and modifies considerably the accepted version of the evolution of the modern corporation. Cf. also Shannon, "The Coming of General Limited Liability," *Economic History Supplement* (*Economic Journal*), January, 1932, p. 274.

[3] Davis' investigation of charters prior to 1800 shows that only eight charters were granted for industry or manufacture, or less than 4 per cent of all those issued in the various states. Public service enterprises received over 75 per cent of the charters (*Essays in the Earlier History of American Corporations*, II [Cambridge, 1917], 26). But these figures are misleading for the post-1800 period.

ing from a corporate grant-of-existence one or more essential privileges regarded through centuries as inseparable from the corporate body, e.g., perpetuity and the right to limit shareholders' liability.

Students of our early industrial development agree that the great majority of projects were launched[4] without charters; they apparently did not regard unlimited liability as a serious business handicap. It is easy to understand that in enterprises largely experimental in character and backed by enthusiasts, attention would be centered on other desired features of group organization—concentration of power in a few hands, perpetuity of existence, and free transferability of shares. These characteristics, rather than limited liability, are the true earmarks of the business company in distinction from the partnership.[5] The negative advantage of protection from potential future debts was shunted into the background. Particularly in the great land companies of the last decade of the eighteenth century this modern corporate advantage was regarded as quite unimportant beside those just mentioned.[6] Other handicaps were added. Perpetuity of existence began to be denied.[7] Burdensome taxes or contributions to school

[4] Cf. Clark, *History of Manufactures*, I (Washington, 1916–28), 455: "Most mills and factories continued to be owned by single proprietors, partners, or unchartered joint stock companies." Cf. also Cole, *American Wool Manufacture*, I (Cambridge, 1926), 231–33, and Bagnall, *Early Textile Industries* (Boston, 1893), pp. 217, 406, 453, 546–50, *inter alia*.

[5] This is true because in organizations possessing these qualities men may invest capital the while their chief economic interests or activity lie elsewhere. The corporation has its roots wherever this "side-issue" opportunity appears; obviously it has no single source. But many of its earlier manifestations are in temporary undertakings (e.g., shipping ventures) which are less significant than more or less permanent projects (e.g., mining), which German scholars are correct in appraising as the true cradle of modern corporate enterprise.

[6] Robert Morris' projected North American Land Company possessed all the features of a corporation other than the limitation of liability. Its creators never considered the desirability of having a charter. A copy of the printed *Articles of Agreement* is in the Library of the Historical Society of Pennsylvania.

[7] The bank of North America was chartered by various states "for the duration of the war" in 1780–81. Thereafter a charter grant of perpetual existence became the exception; ten years was a common period for a grant after 1790. This was a distinct inroad upon the rigid common-law doctrine that perpetuity was a fundamental corporate attribute (cf. Holdsworth, *op. cit.*, VIII, 202).

funds were imposed. The recipients of many charters had to rest content with the doubtful legal privileges of suing and being sued as an entity, a different tax status, and the pomp of a corporate seal.

The ensuing quarter-century of legislative niggardliness was most marked in the industrially active states of Massachusetts and Connecticut, where the majority of manufacturing enterprises began. New York was more open-handed, and only in certain instances (to be described) did she insist upon withholding the desired legal rights. In the two New England states, a rising tide of dissatisfaction finally put an end to the policy of selectivity among petitioners, and resulted in the general acts of 1830 in the former and of 1832 in the latter state. The situation had come to an *impasse;* charters increasingly became of doubtful value in so far as they did not permit a limitation of liability. Shareholders not participating directly in management wanted its protection. On the other hand, creditors' losses and numerous instances of managerial chicanery reinforced the position of those who wanted to impose unlimited liability as a protection for the public interest. It was the familiar cry of "business will leave the state"[8] which as much as any other argument finally vanquished the public defenders. But the contest left an interesting series of charters and frequent necessity for legal adjudication before it ended.

There were in Massachusetts,[9] first of all, a group of early charters which specifically imposed full liability upon the shareholders, concurrently with other charters of the normal form.[10] Such charters were granted to the following companies:

Proprietors of the Locks and Canals on the Connecticut River (1792)
Proprietors of the Boston Water Works (1795)

[8] An article in the *American Jurist*, IV (1829), 307, claimed that millions in capital were being diverted out of Massachusetts by the legislature's refusal to grant adequate charters.

[9] Professor E. M. Dodd has painstakingly examined the period 1800–1830 in Massachusetts, and the details of charters granted are described in his article, "Business Corporations in Massachusetts," included in the *Harvard Legal Essays* (Cambridge, 1934).

[10] Justice Field, in *Child* v. *Boston and Fairhaven Iron Works*, 137 Mass. 516 (1884), surveyed this period of varying charter provisions.

Massachusetts Mutual Fire Insurance Company (1798)
Ossapee Mining Company (1801)
Danvers and Beverly Iron Works Company (1803)
Amesbury Nail Factory Company (1805)

Among the charters which granted limited liability in the same period, that of the Newburyport Woolen Manufactory (1794) is best known. In the case of early insurance companies, if the president or directors knowingly wrote policies after the capital stock had been impaired by losses, charters provided that their property would be held liable in actions by the policyholders. Such a clause was first inserted in the charter of the Portland Marine and Fire Insurance Company in 1803.

The first general Massachusetts statute imposing liability was passed in 1808. By its terms executions could, after fourteen days, be levied on "members" of any manufacturing corporation thereafter created if the latter failed to show sufficient property to satisfy the judgment. This, of course, was a different sort of liability than that imposed by the charters mentioned above, since it was a remedy applicable only after ordinary recourse against the corporate treasury had failed.[11] In 1818 this statute was amended to provide that members liable were those who held their shares at the time the debt was incurred, not at the time action was brought. In 1821 it was further amended to provide that "every person who shall become a member of any manufacturing corporation shall be liable for all debts contracted during the time of his continuing a member." This statute during its life (it was finally repealed in 1829) applied only to manufacturing corporations. Banking and insurance companies were governed by the provisions in their charters. Turnpike companies were exempt from this imposition of liability. The unfriendly attitude of the Massachusetts courts (perhaps reflecting the same attitude among the business leaders of the time) is reflected in the opinion of Chief Justice Shaw in *Gray* v. *Coffin*.[12] "To create any indi-

[11] For this judicial interpretation of the statute cf. *Leland* v. *Marsh*, 16 Mass. 389 (1820), and *Marcy* v. *Clark*, 17 Mass. 334 (1821). In the latter case Chief Justice Parker castigated the action of one Marcy, who had transferred his stock in a manufacturing company to a penniless "dummy" in order to evade the statute.

[12] 9 Cushing 192.

vidual liability of imposition for the debt of a corporation . . . . is a wide departure from established rules of law founded in consideration of public policy. . . . . It is therefore to be construed strictly. . . . ."

The unpopularity of the law, especially after the change in 1821, led to its modification in 1827. Creditors were forced to bring suit, against the corporation and also against any individual stockholders, within one year after a debt was in default. The principle of contribution from brother-stockholders was introduced to protect an individual singled out for suit. Trustees and holders of stock pledged as collateral were exempt from liability, and thus from creditors' suits. This led to a wholesale evasion of the law in the next three years by placing stock in the hands of trustees, or pledging it as collateral.[13] Finally, the general incorporation act of 1830 provided for filing of a certificate stating the amount of fully paid-in stock. Maine in 1823 had already rejected the unlimited-liability principle, soon after her establishment as an independent state.

The situation concerning corporate liability in Connecticut during this period was most interesting,[14] because the experimentation was largely conducted by inserting varying clauses in specific charters. A charter granted in 1813 to the Andros Manufacturing Company[15] illustrates the early attitude of the legislature. In case of a judgment brought against the corporation where execution was defaulted, a levy could be made after thirty days upon the private property and bodies of the members. A typical provision of this kind in charters of 1813, 1814, and 1815 was: that members "shall be responsible in their private capacity, provided said corporation shall become insolvent, or its property

[13] Angell and Ames, *Private Corporations* (Boston, 1846 ed.), p. 549.

[14] Angell and Ames (*ibid.*, p. 548), summarizing legislation on this point, curiously omitted mention of the various experiments tried by the Connecticut legislature in imposing liability on stockholders, and implied that Massachusetts was the only state which made efforts along this line. No study of Connecticut comparable to that of Professor Dodd for Massachusetts is available.

[15] *Resolves and Private Laws of Connecticut, 1781–1836* (2 vols.; Hartford, 1837), I, 723. The course of events in Connecticut described above is summarized from these volumes unless otherwise noted.

cannot be found."[16] Thus the liability remained secondary to that of the corporation itself, but no specific interval was mentioned. There was no uniformity among the charters of these three years as to whether liability should be determined as of the date when debts were contracted or the date when judgment was defaulted. This led to exactly the same difficulty dealt with by statute in Massachusetts.

There were two interesting cases after 1820 in the Connecticut Supreme Court involving the interpretation of such charters. In the first[17] Chief Justice Hosmer ruled that "while the members of the company enjoyed all the privileges of a corporation, their creditors possess the rights . . . . furnished by law against an ordinary co-partnership. . . . . They are answerable precisely as if there had been no incorporation"—i.e., for debts incurred when they were members. But in another suit brought by the Middletown Bank against a stockholder in a manufacturing company in that town (the Middletown Manufacturing Company), the court again had occasion[18] to pass on a similar charter, which failed to specify under what exact condition liability arose. Of the five members then comprising the court, Chief Justice Hosmer and another argued that the liability should have been determined when the debt was originally contracted with the bank, as in the former case. But the majority of the court favored the opposite view, on the ground that the liability was entirely secondary in a corporate body, and that to adopt the view of Hosmer would be to treat the members simply as co-partners. Both groups were obviously hostile to the activity of the legislature in imposing any liability upon the corporate shareholders. Hosmer pointed out sarcastically that there were no cases from England bearing on the point—"none at all bearing upon the question can be found. No such being as the one under consideration ever existed there. This is a creature of our own manufacture." Justice Chapman of the majority, similarly critical, asked: "Was it the intention of the legislature that a man should be in jeopardy all his lifetime if

[16] Phraseology is almost never the same, reflecting a lack of expert draftsmanship.

[17] *Southmayd* v. *Russ*, 3 Conn. 52.

[18] *Middletown Bank* v. *Magill*, 5 Conn. 28, at 70.

he should purchase a single share in the stock of this company?" In his decision he accordingly narrowed down as much as possible the possible effect of the liability clause.[19]

The inconsistency of the legislature in imposing these liability provisions upon various corporations led to a statute of 1817 declaring that in the future, under certain conditions, no members of manufacturing corporations should be personally liable for debts. The inconsistency had been startling in some cases. In May of 1814, for example, the Groton Manufacturing Company had been incorporated with a clause in its charter imposing liability upon "those who were stockholders at the time of contracting such debts." In October, 1814, the Hartford Manufacturing Company was incorporated. In its charter liability was imposed, with no particular qualifying phrase; this had also been the case in the charter of the Middletown Manufacturing Company, just discussed. The 1817 act required, as an alternative, that corporations could if they chose certify to a proper county official the amount of their capital stock. If this were done annually, so that creditors could be kept informed, no liability would be imposed.

But the legislature seemed unwilling to be bound by its own actions. In the next few years some new charters were granted which in the former manner imposed shareholders' liability. This was true of the Hartford Brewing Company charter in 1821, and of those of one or two other corporations during the period. Where the privilege of certifying the amount of stock was granted, the typical phrasing was: "The company shall be bound to keep the said amount of capital stock subject to the demand of creditors, unless the stock shall be reduced by a vote of said company, in which case public notice shall be given." The notice was to be by newspaper publication in the proper county.

This procedure seems to have been unsatisfactory to the legislators, for by 1826 there had begun to be a liability imposed on

[19] The arguments of counsel in this case indicate clearly that from the practical business standpoint at this time no real distinction was felt to exist between private companies and corporations, especially when the legislature had withdrawn the chief legal privilege of a corporation. Creation of business organisms by private initiative and contract was firmly established, to be sanctified legally in one general incorporation law two decades later.

officers or directors who permitted the reduction of capital. In the charter of the Connecticut Carpet Manufacturing Company of 1827 directors causing or allowing a reduction of capital "shall be liable as traders in common, jointly and severally, for any debts incurred at the time of or subsequent to the reduction of capital."

Still further change in the legislative attitude came as late as 1833 in the Chelsea Manufacturing Company's charter. The liability formerly including only directors or officers (there had been no consistency in assigning liability to one or both) was extended to include stockholders "consenting thereto or causing the same to be done." In 1834 the Connecticut Soap Manufacturing Company charter contained a slightly different provision; liability was to be imposed after a reduction of capital, but only upon the stockholders who had received the distribution. Apparently the practice aimed at was a deliberate vote to return part of the capital to stockholders when profits were seen to be declining. The modern stockholder in large corporations would certainly benefit if this practice were more common in the twentieth century!

The attitude of the courts toward liability changed also during this period. Thus in *Deming* v. *Bull*[20] the court had to pass upon the liability clause in the charter of the Hartford Brewing Company of 1821. The clause in that case was "that for debts which may, at any time, be due from said company, the stockholders shall be responsible in their private capacity, provided said corporation shall become insolvent, or the property and estate cannot be found, and not otherwise." The defendant Bull owned sixty-two of the one thousand shares and had been sued for the total debt claimed by the plaintiff against the corporation. The Supreme Court unanimously decided that the liability was equivalent to the common-law obligation of joint debtors or copartners. Since the defendant was a stockholder both when the debt was incurred and when judgment was defaulted, the issue in *Middletown Bank* v. *Magill* above did not arise. But the court's comments implied that they would have agreed in that case with the minority rather than the majority doctrine. The defendant

[20] 10 Conn. 409.

attempted to limit his liability to a pro rata basis, i.e., 6.2 per cent of the total, but the court rejected this plea. The language of the decision indicates clearly that the court regarded the stockholders as partners.

A unique 1786 statute of New York,[21] creating proportional liability for a specific group, was a pioneer alteration of this common-law principle of liability *in solido*. By its terms a group known as the Associated Manufacturing Iron Company of the City and County of New York were granted for a term of seven years the right of assuming proportional liability for any debts incurred, measured by the contribution of each member. For the information of creditors, a statement of the members and their share of the capital was to be filed annually in Albany. But although New York thus became the first state to tamper with the liability principle, she tried much less experimentation in the succeeding quarter-century than her two New England neighbors in varying the common-law rule of limited liability for corporations. Nevertheless, specific clauses were occasionally inserted in charters making some changes in the principle of liability, and a little-known clause of the famous 1811 general incorporation act imposed what in practice amounted to full liability.

In March, 1791, in the charter for the "President Directors and Company of the Bank of New York"[22] it was provided that the debts of the bank, including of course circulating notes, should not exceed three times its capital stock. The directors were to be liable for any excess beyond this limitation, excepting those who were absent or cast a dissenting vote when the debt was authorized. This same clause was repeated in the 1792 charter of the Bank of Albany[23] and the 1793 charter of the Bank of Columbia.[24] But in March, 1797, occurred the first general exception to the common-law rule of limited liability to be found in this country, in the charter of the Hamilton Manufacturing Society,[25] which was later known as the Albany Glass Works. In that charter it was provided that nothing in the charter should be construed "to exonerate the members of the said corporation from any debts

[21] *New York Statutes* (1885 ed.), II, 295.

[22] *Ibid.*, III, 237. [23] *Ibid.*, p. 364. [24] *Ibid.*, p. 429. [25] *Ibid.*, IV, 95.

which may hereafter be incurred by the directors"; on the contrary, every member "shall of his individual capacity be liable to be prosecuted for any debt due from the said corporation to any person whomsoever."[26] The charter further directed that annually the directors were to publish in newspapers a list of the stockholders and that a similar list must be filed with the Albany County clerk, so that creditors could know whom to sue.

In the case of New York insurance charters, which were granted frequently after 1798, there was usually a clause imposing a double liability upon stockholders at the time of dissolution, but not otherwise.[27] In the many turnpike charters there was no effort to change the common-law rule. This was true also of the Niagara Canal Company, chartered in 1798, and the various charters for the early Mohawk Valley Canal Companies. In a charter of 1806 to the Rensselaer Glass Factory[28] there was no imposition of liability upon the stockholders such as the Glass Works charter of nine years before had contained. But as late as 1825 the Dutchess and Orange Steamboat Company had in its charter (Art. VI) this clause: "The members of the company shall be liable individually, in the same manner as carriers at common law, for the transportation of all goods. . . . ."[29]

The ten years from 1804 to 1814 are generally regarded as a period of great liberality toward corporations, under the influence of the patriotic movement to stimulate home manufacture. The best-known result of this period was New York's Act of 1811.[30] Yet, properly interpreted, this act did not at all usher in the movement for generalized incorporation laws. It was passed simply as a means of encouraging groups with small capital to enter general manufacturing. The date of its passage is also suggestive of the close connection it had with national Democratic

[26] Davis points out that this is the only charter he encountered in his thorough survey of all those granted before 1800 which provided for unlimited liability (*op. cit.*, II, 301).

[27] Cf. *New York Statutes*, IV, 192, 198, 241, for examples, including one where this clause was not included.

[28] *Ibid.*, VI, 264.

[29] Cf. *Allen* v. *Sewell*, 2 Wendell 327. The company was not subject to the general act of 1811.

[30] *New York Statutes*, VII, 233.

policies.[31] The act limited capital of each unit formed under it to fifty thousand dollars, and the duration of the charters to five years. These were certainly unattractive features. The directors were termed "trustees" throughout the act, possibly indicating a specialized position for them in the minds of the legislators—as semipublic guardians of the to-be-encouraged expansion of manufacture. There was a clause imposing a proportional liability upon any stockholder who had received a distribution of assets upon dissolution. Since existence was limited to five years, this was equivalent in practice to the ordinary liability of partners or shareholders in an association; debts, even though incurred in the first year of existence, could hardly be evaded or compromised before the corporate character of the enterprise was automatically destroyed. There was a clause making the shares personal estate, and another permitting transfer of shares to be carried out as each company might require in its by-laws. Of the considerable number of projects receiving charters under this act, few endured beyond 1815. During the next twenty years this act had only a slight effect upon the attitude of business men toward charters; they continued to choose the association form in preference, just as most manufacturers did in the other states.

New York made an indirect attack upon the business value of corporate charters in 1822 by passing the Limited Partnership Act, again a pioneering step. From the practical legislative point of view, the act was favored by many out of resentment at the clause in the Constitution of 1821 requiring that all charters must receive assenting votes from two-thirds of both houses. Obviously the opportunity to secure a limitation of future liability in a limited partnership, protecting the large contributors of capital to an enterprise, reduced sharply the incentive to secure a charter. This law of New York was not generally imitated in other states until after 1835.[32]

Other states had much less opportunity to play fast and loose

[31] Supporters of Jefferson's Embargo and the succeeding hostile policy toward England of Madison naturally regarded domestic manufacture as a desirable weapon to decrease English prominence in our importing trade.

[32] For a comprehensive study of the passage of limited partnership laws in the various states, cf. an article by Stanley E. Howard in the *Journal of Business*, VII (October, 1934), 296.

with charter rights, since most enterprises then seeking grants were recognized at the time as "quasi-public," contributing in some fairly direct manner to general welfare. With these undertakings there was much less tendency to experiment. But in a charter of 1807 to the Philadelphia Domestic Society,[33] the legislature of Pennsylvania included a clause making directors liable for any payments to stockholders out of capital rather than earnings. This modern rule was clearly set forth, as it was in later charters to the Lancaster and Susquehanna Insurance Company (referring to unearned premiums)[34] and other insurance or manufacturing companies.[35] Similarly, South Carolina made directors of insurance companies liable for payment of dividends out of capital. But in these and other seaboard states the attitude was much milder than in New England, simply because far fewer enterprises of a purely private nature sought charters. They proceeded as partnerships or as small unincorporated companies.[36]

The legislative vagaries in Massachusetts and Connecticut after 1799 are important in the history of control over corporations in this country. It was not against all applicants for charters that the discriminatory policies were aimed. Only those groups which appeared to be seeking license for operation in fields where private gains seemed to outweigh the potential public benefit were given "limping" charters and denied the privilege of limited liability. That this policy was dropped after a generation can be ascribed to the growing size of the business class (or at least its growing ability to impress legislators) and to the general spread of laissez-faire thinking. If we are to judge by known examples of

[33] *Laws of 1806–7*, c. 50, p. 68. This was the successor of the pioneer Philadelphia Society.

[34] *Ibid.*, c. 55, p. 80.

[35] E.g., the Whitestown Manufacturing Company charter of 1816; see *Laws, 1815–16*, c. 17, p. 23.

[36] No obstacles were placed in the way of such bodies acting as corporations except in the field of banking, where the legislators were jealous of their right to create banking corporations. For the experience of Virginia in attempting to exclude unincorporated companies from the banking field cf. Starnes, *Sixty Years of Branch Banking in Virginia* (New York, 1931), pp. 38–40. For Pennsylvania's efforts cf. the Supreme Court's summary in *Myers* v. *Irwin*, 2 S. & R. 368 (1816).

chicanery practiced by executives and stockholders of small industrial or banking corporations of the day,[37] it was a wise policy. It might well be revived in the twentieth century for those small enterprises which seek shelter under the roof of limited liability by securing one of today's "automatic" charters. The man who incorporates himself, with his wife and perhaps stenographer acting as the other incorporators and directors, is often guilty of far more deliberate fraud and deception than the oft-condemned executives of large corporations. The large body, with many scattered and non-participating stockholders, deserves the gift of limited liability, lest it be unable to attract the large quantities of capital which are socially and economically desirable. It may well need regulation along other lines. But in our anxiety for control over the large unit, and perhaps out of sentimental sympathy for the "small man," we have neglected the latter's obvious abuse of the liability privilege. Nor would the honest, able man suffer if he were not permitted to use the device of incorporation with its accompanying limitation of liability. Revival of the Massachusetts and Connecticut attitude of 1800–1830 in this specific direction might be of greater social value than a large proportion of the legislative tinkering witnessed in recent years.

[37] The case of *Middletown Bank* v. *Magill*, cited previously, shows the same sharp practices to have been prevalent in 1815–16 as are used today by many small or medium-sized corporations—or rather by their officers.

H. M. ROBERTSON ON MAX WEBER AND HIS SCHOOL[1]

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THE present note will not be concerned with a general critical evaluation of Dr. Robertson's book on *Aspects of the Rise of Economic Individualism*. For that, in the absence of a sufficient knowledge of economic history, I, a sociologist by profession, am not competent. I shall rather take my departure from the subtitle of the book—"A Criticism of Max Weber and His School."[2] It will, I think, be generally agreed that a scholar who undertakes an adverse criticism of another's work can only hope to succeed when he has fully understood the work he has criticized and has either refuted the position he is criticizing on its own ground or has satisfactorily demonstrated that the mode of attack which the author has taken is so altogether out of touch with the facts of the situation that it can be thrown out without detailed refutation. It is my contention that Dr. Robertson's criticism fails to succeed in any one of these three directions and that Weber's work survives his onslaught without essential damage.

In the first place it is necessary to state quite specifically what the object of the attack, Weber's essay, *The Protestant Ethic and the Spirit of Capitalism*, was meant to be by its author. It was not a general theory of the "cause" of modern capitalism in the least. It was rather a specialized monograph maintaining the thesis that the Protestant ethic, in ways which Weber analyzed in great detail, could reasonably be assigned an important rôle along with several other factors in the great historical process which has resulted among other things in producing the modern economic order.[3] In the introduction to his series on the "Sociology of Religion," Weber specifically mentions three of these others—modern science, itself partly influenced by capitalistic interests, and the rational structures of law and administration, again

[1] H. M. Robertson, *Aspects of the Rise of Economic Individualism: A Criticism of Max Weber and His School*. Cambridge: Cambridge University Press; New York: Macmillan Co., 1933. Pp. xvi+223. $3.50.

[2] The concentration of this note on Weber himself rather than the "school" is justified by the fact that Dr. Robertson scarcely mentions any other authors.

[3] Weber, *Protestant Ethic and the Spirit of Capitalism* (New York and London, 1930), p. 29. (Translated from *Gesammelte Aufsätze zur Religionssoziologie*, Vol. I.)

partly influenced by capitalistic interests. Thus these last two elements he thinks of as quite separate from the Protestant ethic, but each in its concrete development is partly independent of, partly influenced by, the third, "capitalistic interests."[4] But with respect to the Protestant ethic alone he quite specifically states "we are dealing with the connection of the spirit of modern economic life with the rational ethics of ascetic Protestantism. Thus we treat here only one side of the causal chain."[5] At the end of the essay he again reiterates this qualification: "It would further be necessary to investigate how Protestant Asceticism was in turn influenced in its development and its character by the totality of social conditions, especially economic. . . . . It is of course not my aim to substitute for a one-sided materialistic an equally one-sided spiritualistic causal interpretation of culture and of history."[6]

Though Dr. Robertson does not explicitly deny that Weber introduced qualifications into his thesis, he continually writes in a vein which allows the reader to think that Weber was putting forward a "monistic" view of capitalistic development such that the demonstration of the importance of any factors other than the Protestant ethic was quite sufficient to refute Weber's position. Obviously such is not the case. Even the demonstration of the importance of the influence of capitalistic interests on the Protestant ethic itself is not in the least conclusive unless it goes so far as a proof that this influence completely accounts for it. Though he sometimes seems to claim this, I am sure a disinterested reader will agree with me that Dr. Robertson has furnished no such proof. For Weber the *concrete* Protestant ethic was not a wholly independent entity, and he advanced no specific claim as to the quantitative importance of the purely religious element in it. He merely claimed it was "important."

But we can be much more specific than this. Dr. Robertson claims to refute Weber further by taking up religious doctrines relating to economic life and attempting to show that these doctrines do not bear out Weber's claims of an influence on capitalistic development. The argument runs in terms of three main propositions: first, that Puritan teaching was not, particularly in its early phases, nearly so favorable to capitalism as Weber maintained; second, that where it was relatively favorable, especially in later phases, Catholic doctrine was just as favorable or in many cases more so; third, that in both cases the discernible process of change is due to the influence on the policy of religious bodies of an independently rising capitalistic class which forced

[4] *Ibid.*, p. 25. [5] *Ibid.*, p. 27. [6] *Ibid.*, p. 183; see also p. 91.

concessions which were in both cases essentially inimical to the principles of religious ethics.

I find two main difficulties with this central argument of Dr. Robertson in so far as it claims to be a valid criticism of Weber's position. The first concerns the point at which he chooses to seek his evidence. Dr. Robertson, that is, concentrates entirely on the concrete maxims of conduct put forward by religious writers and completely neglects to consider the religious derivation of these maxims. That is, he is concerned with what true believers were exhorted to do, not with the motivation of the typical believer in doing it. He entirely neglects the possibility that very similar maxims will work out quite differently in practice according to differences in the motivational background. But it is the latter with which Weber is primarily concerned. As he put it, ascetic Protestantism placed peculiarly powerful "psychological sanctions"[7] on certain types of conduct and the source of these sanctions lies in the way in which Protestant dogma, above all the doctrine of predestination, canalized the individual's attitudes and conduct in a certain peculiar direction—that of systematic, rational mastery over the external environment, and lent these attitudes a very special ethical intensity. This argument Dr. Robertson entirely ignores, but it is the central core of Weber's thesis.

A specific case which brings out the difficulty with especial clarity is Dr. Robertson's treatment of the doctrine of the "calling."[8] He first points out that the doctrine in the works of the *early* Puritans did not work in the direction of encouragement of acquisition but rather in that of a check on personal ambition and covetousness.[9] It is rather an affirmation of conservatism in a world of economic change. Moreover, there is no essential difference from the Catholic doctrine. Then Dr. Robertson proceeds to note that there was a marked change in Puritan teaching by the seventeenth century and that the doctrine of the later period as represented by Richard Baxter was much more favorable to capitalism than the earlier doctrine. Then he accuses Weber of paying attention only to the later doctrine and projecting it into the past—his "unhistorical" method made him incapable of perceiving the change.[10] Finally, Dr. Robertson asserts roundly and without qualification that the change was due primarily to the influence of capitalistic interests on religion without even entering into the question whether on the religious side itself there might not be causes of change also.[11]

[7] *Ibid.*, p. 94. [8] Robertson, chap. i. [9] *Ibid.*, pp. 6–8. [10] *Ibid.*, p. 15.

[11] I purposely do not enter into any consideration of Dr. Robertson's attempted refutation of Weber's philological arguments about the idea of the "calling" as I do not feel myself competent in that field.

A more inconclusive "criticism" than this would be difficult to imagine. In the first place it simply is not true that Weber failed to notice the change in the doctrine of the "calling." Weber says, "But it is not to be understood that we expect to find any of the founders or representatives of these religious movements considering the promotion of what we have called the spirit of capitalism in any sense the end of his life-work. We cannot well maintain that the pursuit of worldly goods, conceived as an end in itself, was to any of these of positive ethical value."[12] Then having made this definite misstatement of Weber's position, Dr. Robertson proceeds to ignore the central theme of Weber's argument, that precisely through the processes of its own internal dynamic development the Protestant ethic, in a manner quite unforeseen by its founders, had the practical effect of creating attitudes which could not but powerfully further types of activity of the greatest importance to economic life. Reduced to its lowest terms then, Dr. Robertson's argument is as follows: (1) There are two main forms of the concrete doctrine of the "calling," early and late (a true statement). (2) Weber did not perceive this difference and assumed the doctrine to be constant (a bald misstatement of Weber's position, inexcusable in anyone who claims to be a careful scholar). (3) An unspoken premise that the religious element in this doctrine must be constant (which is without justification, either in Weber or in the facts, and which in any case could not be established without careful analysis of the religious ideas underlying the doctrine of the "calling" and their development, which Dr. Robertson omits entirely to provide). Only on the basis of such analysis, if at all, could Dr. Robertson's conclusion (4) that the change is due to the influence of "capitalistic interests" be substantiated.

But underlying all this discussion is my second difficulty which concerns a still deeper misunderstanding of Weber's position. Dr. Robertson, at various points in his book, makes much of what he regards as the fallacies involved in Weber's "sociological" method and proposes to rectify them by using a sound "historical" method. There is naturally no space in such a brief note to enter adequately into the complex methodological issues involved. But it seems to me that this attitude of Dr. Robertson is closely associated with the misunderstanding just referred to since the latter is shared by a number of historians who have essayed to criticize Weber's work.

Whatever else it may be, I should think of a sociological theory as concerned with the discrimination and analysis of certain causal factors

[12] Weber, p. 89.

in concrete situations. It consists not merely in working out the genetic antecedents of a given phenomenon, but also of analysis of the phenomenon itself, breaking it down into the various causal elements which go to make it up. Whether it be true of historians in general I shall not attempt to judge, but in this particular case the tendency has been for Dr. Robertson and others to take "capitalism" as an integral concrete phenomenon. For purposes of their discussion its "nature" is not in question but only its antecedents or "causes" in *that* sense.

But it is seldom possible for a "historical" method in this sense to operate without "sociological" preconceptions, and in fact there is clearly discernible in Dr. Robertson's and others' discussions a quite definite thesis as to what constitutes the essential element of capitalism. In this particular case it is evidenced by its equation with what Dr. Robertson calls "economic individualism."[13] What is meant here by economic individualism?

It is a version of something which has played a very great part indeed in modern social and economic thought—perhaps more generally described as the "rational pursuit of individual self-interest." The tendency is to think of the economic order as consisting of a plurality of individuals motivated primarily by the pursuit of their own economic interests, and of the total picture of the order as a resultant of these multifarious activities of the numerous individuals.

Now such a concept can, in turn, be applied in two essentially different ways which are often confused. It may, in the first place, be used to describe a concrete state of affairs—that of the "modern economic order" or "capitalism." Such a use implies a factual thesis that the modern order constitutes an "individualistic" order in this sense. Dr. Robertson's equation of capitalism with economic individualism certainly involves this thesis. In the second place such a concept may be used historically to help explain the genesis of the order. Then it becomes a question of the relation of the rational pursuit of self-interest as a causal factor to others in the situation.

The point of departure for understanding Weber's position seems to me to be the realization that his first difference from the position just sketched lies in his interpretation of the elements involved in the concrete phenomenon he calls "capitalism." It is most emphatically not adequately described as Dr. Robertson's economic individualism, though that is one of the elements involved in it. It is true that Weber concurs in many of the conventional descriptive terms applied to the

[13] Robertson, p. 15.

"capitalistic system." It is "individualistic" in the sense opposed to governmental control. It is "competitive,"[13] and above all it is "acquisitive"—the earning of profit becomes the immediate end of "business" activities.

But Weber sees, what Dr. Robertson does not, that these descriptive terms do not immediately justify the explanation of these features by the element of "economic individualism." On the contrary, his deeper, sociological analysis of the concrete phenomenon resulted in the discovery of another element of a totally different order but manifested on the same, or almost[14] the same, concrete aspects of the system which Dr. Robertson calls "individualistic" and "acquisitive." This is not the pursuit of self-interest, that is, of means to personal satisfactions, but is rather a case of "objective," "selfless" devotion to worldly tasks, which is "disinterested" as opposed to the "interest" of the other element.[15] Under certain peculiar circumstances which Weber outlines, this disinterested attitude may become devoted to the task of profit-making—*not* for the sake of enjoying the expenditure of the profits, but of earning as an ethical duty in itself. This is what Weber calls the element of "rational bourgeois capitalism" as distinguished from the "capitalistic adventurers." It is this element, not the total concrete phenomenon of capitalism, which is the theme of the essay on *The Protestant Ethic*. Dr. Robertson's complete failure to understand this background is vividly indicated by his cavalier dismissal of this element in his initial definition of terms.[16]

Only with this in mind is it possible to see the basis of the difference over the rôle of religion in "capitalistic" development. Christianity has certainly been in all its phases in one sense "other-worldly." It has

[14] There is no space here to go into the concrete reasons for suspecting the presence of such an element. Weber gives a number. One important one is the lack of limitation on the extent of approved acquisition; another, the disapproval of self-indulgent and ostentatious consumption.

[15] Two independent descriptions of the same phenomena from totally different theoretical points of view from Weber's are Veblen's "Instinct of Workmanship" and Professor Carver's "Work Bench Philosophy."

[16] "What was this capitalist spirit? To Weber it was hardly more than bilateral. It consisted first in a rationalist as opposed to a traditionalist outlook. It consisted also in the desire to seek profit continuously (by means of the rational organization of free labor) for its own sake—even as a duty—and not for the purpose of enjoying the fruits. . . . . But Weber's second criterion of the capitalist spirit is too narrow. It leads inevitably to the defect which I feel vitiates his whole argument: he hardly considers any capitalist other than the Puritan capitalist who seeks wealth for the fulfilment of his 'calling'" (Robertson, p. xii).

always held the ultimate ends of human life to lie in a transcendental sphere. Hence it has always given only a relative sanction to the "world and the flesh" as necessary evils. Economic acquisition has received its blessing mainly as a necessary evil, and has been approved only in proportion as it was closely related to "function" as an indispensable means of securing the necessities of life or social status. On the other hand, capitalistic acquisition with its tendency to become detached from such relatively approved functions, to degenerate into a competitive game, to promote avarice or, with great wealth, un-Christian self-indulgence has pretty generally been under suspicion. This suspicion has been the more acute the more closely acquisition has approached the type of "economic individualism."

Protestantism has been no exception to this general rule. Disapproval of avarice, of covetousness, of self-indulgence is as strong as in any other branch of Christianity. Indeed, in some respects, Protestant "asceticism" has been more rigorous and uncompromising than Catholic lay ethics, a fact upon which Weber lays great stress. Thus, so long as "capitalism" is identified with "economic individualism" the gulf between it and Christian ethics cannot be bridged. The only possible alternative to acute hostility and attempted suppression of capitalistic tendencies is "accommodation" and "concession." From this point of view the relation of the development of "capitalism" to Christianity in all its forms has necessarily been one of "emancipation" from religious control, partly by out-and-out defiance of religious authority, partly by compromise on the part of the latter with the evil necessities of the world. There can be no doubt of the existence and importance of this process, which is the sole concern of Dr. Robertson's argument.

It is not, however, Weber's main concern. He is not in this essay interested in the problem of the development of "economic individualism" in Dr. Robertson's sense at all, but with that of the other element. But the question of the relation of this to Protestantism is an entirely different matter. The Protestant repudiation of monasticism, without in the least affecting the other-worldly orientation of its ethics, threw the ascetic element into everyday life—"every man became a monk." Especially in the Calvinistic form this resulted in a positive religious sanction of mundane activities, but at the same time under a strict ethico-religious discipline in certain respects. This *combination* is what Weber calls "worldly asceticism" (*innerweltlische Askese*).

The doctrine underwent, for religious reasons, a process of change. It was not at the beginning but at a later stage in the process that the

"individualistic" aspect of it became sufficiently prominent for it to become an important element in the promotion of "individualistic economic enterprise"—roughly the seventeenth century. At that time the connection with the religious background was still evident. Later it became progressively secularized and this connection largely disappeared. But the element of positive ethical value remained and still remains as a basic element in the modern economic order. Thus according to Weber the peculiarities of Protestantism had two kinds of effects which differentiate it from that of Catholicism. In the first place, its sanction of "capitalism," that is, of individualistic, acquisitive activities, was positive and not merely permissive. But at the same time this positive sanction was accompanied by a stringent ethical control totally lacking in the concept of "economic individualism," but which served because of its peculiar character to promote rather than to retard the development of modern "industrialism."

All this is totally outside of Dr. Robertson's horizon—it is dismissed as the unsound "sociological" method. As previously noted, he makes capitalism virtually interchangeable with "economic individualism." With the exception of the chapter on the doctrine of the "calling," which has already been commented on, and a short discussion of Calvinist theocracy, which is open to much the same criticism, the whole of the book is concerned with the aspects of the economic order which are distinguished by an individualistic resistance to outside control—and religion is thought of as such an outside agency imposing an essentially foreign control which gradually breaks down under the pressure of capitalistic interests.

It is typical in this connection that Dr. Robertson thinks of the religious influence throughout in terms of church discipline imposed upon the individual by an authoritarian agency, entirely ignoring Weber's insistence that he was not concerned with church discipline but with the working of religious motives and their secularized derivatives on the individual directly. The most typical instance of this bias is the large amount of space Dr. Robertson gives to the question of usury which, he claims, is of central importance, for "Free trade in capital is the essence of capitalism."[17] Weber, on the other hand, states "for, as has been said, the prohibition of usury and its fate can have at most a symptomatic significance for us, and that only to a limited degree."[18] Dr. Robertson does not even refer to this statement of Weber's, to say nothing of raising the question why Weber ignored the usury question

[17] Robertson, p. 111. [18] Weber, p. 202.

(there was only one quite incidental reference to it in Weber's text). Yet in a "criticism" of Weber, Dr. Robertson devotes two and a half chapters to this question without ever even attempting to prove that it has anything to do with Weber's problem.

Thus throughout, Dr. Robertson has "refuted" Weber by persistently ignoring the problems Weber was concerned with and talking about something else. There is no evidence that Weber was in the least unaware of that something else—he discussed it quite fully on a number of occasions under the heading of "speculative capitalism" and the "capitalistic adventurers." He just didn't happen to be concerned with it in this particular study. On the other hand, neither he nor, as far as I know, anyone else is concerned to deny either the existence or the importance of capitalistic interests as a factor. But neither can I see that Dr. Robertson has brought the slightest evidence of any sort to refute Weber's contention of the importance of disinterested ethical discipline in modern economic life, or Weber's explanation of its origin. Considered by its subtitle as a "Criticism of Max Weber and His School," this book quite definitely fails to live up to its promise. I am not concerned to deny either that there are defects in Weber's analysis or that Dr. Robertson has, in his book, made genuine contributions aside from his criticism of Weber. But the former Dr. Robertson has entirely failed to find, and the latter fall outside the scope of this note with the limits deliberately set to it.[19]

[19] Of course Weber was in this essay concerned with the Protestant ethic particularly in contradistinction to the Catholic. But it is again only fair, in reaching a final judgment of it, to take account of the fact that for Weber himself this fell into a much wider perspective. In these terms he thought of the "rationalism" of the Protestant ethic as a peculiarly advanced phase of a "process of rationalization" which to him was the dominant trait of Western culture as a whole. As distinct from the cultures of China and India, for instance, the whole of Christianity, along with Western science, law, administration, and other elements, have a place in this process. So in the wider perspective the difference between the Protestant and the Catholic ethics is somewhat less prominent. Of course, it is too much to expect that Dr. Robertson should have gone beyond the one essay to try to see its significance in terms of Weber's sociological thought as a whole—that would be resorting to the "sociological" method and be unworthy of a historian. But nevertheless, a final assessment of Weber's work cannot omit this.

One other evidence of bias on Dr. Robertson's part calls for comment. On several occasions he quotes Troeltsch—*Social Teachings of the Christian Churches*—on particular points against Weber, but never mentions the fact that on the central point Troeltsch strongly indorsed Weber's position.

BOOK REVIEWS

America's Capacity To Produce. By EDWIN G. NOURSE and ASSOCIATES. Washington: Brookings Institution, 1934. Pp. xiii+608. $3.50.

Any country has the "capacity" to produce more than it actually does. If natural resources be exploited more vigorously, man-power and industrial equipment utilized more fully, and these various factors combined more skilfully, output will doubtless be greater than it is. The critical question in estimating a country's "capacity to produce" is what changes shall be assumed to take place in its scheme of economic practices. Any number of statistical results is possible, depending upon what assumptions of change are made. It is therefore essential that an investigator state clearly what changes in economic organization he assumes in making estimates of "capacity to produce." It is equally essential that he appraise the practicability of whatever changes he specifies and that he preface his estimates of their net effect on the volume of production by a theoretical analysis of their consequences on economic activity at large.

The authors of *America's Capacity To Produce* do not follow this plan. They set out to investigate "America's capacity to produce during the period from 1900 to 1930 with the capital goods and labor force which she then possessed and with the technology and the general pattern of operative and commercial organization then prevailing" (p. 415). But for the word "general" in this statement of the problem, there would, of course, be no problem—or, more accurately, the problem would shift to the measurement of total production; for, given the technology and the pattern of operative and commercial organization, America's capacity to produce is nothing other than what America has produced. The conclusion by Dr. Nourse and his associates that our production in 1929 could have been larger by 19 per cent if the slack in productive capacity had been taken up (pp. 421–22), rests on the implicit assumption that the *general* characteristics of our economic organization remain unchanged while some *special* characteristics are modified. What these characteristics are we are not told; though, presumably, something will be said under this head in the fourth volume—the present volume being the first—of the series on "The Distribution

of Wealth and Income in Relation to Economic Progress." At a later time, then, it may become possible to inquire whether the corrective measures suggested would have sufficed to increase production in 1929 by 19 per cent. In the absence of a plan for economic reconstruction it is impossible to begin to say whether a figure of +19 is more or less plausible than −19, 0, or +190.

The absence of a consciously formulated plan for economic change does not mean that assumptions of change do not enter into the actual process of making estimates; but it does mean that they most often enter unannounced, that their scope is vague, that their practicability is uninvestigated, and that an atmosphere of what appears to be inconsistency is bred. The authors insist that their estimates of productive capacity presuppose "prevailing techniques" (pp. 22, 23, 27, etc.). Yet, they propose to increase the length of freight trains (p. 371), to increase the efficiency of workers in agriculture and merchandising (pp. 40–44 and 389–95), but not of those in mining or manufacture, and even to transfer seven hundred thousand workers from farms and merchandising establishments to factories (p. 414). They propose to "accept the existing seasonal pattern as a fact and to reckon capacity accordingly" (p. 26), for it is no part of their aim to "estimate what capacity would be if the realities of style, weather, and the like were eliminated" (p. 173). Yet, they make no allowance for seasonality in estimating the unused capacity of highways (pp. 362–63); they ordinarily take seasonality into account in estimating the plant capacity of manufacturing industries, but they ignore it in reckoning the labor requirements of these industries (pp. 512–18); they adjudge the seasonal fluctuations of recent years in the automobile industry as "excessively high" and therefore make only partial allowance for the existing seasonal pattern (pp. 232–33, 389)—even though the intensified seasonality of this industry is cited in the introductory chapter of the section on "Fabrication" (p. 173) as the kind of economic fact that the investigators will accept in preparing estimates of capacity. In the early pages they announce that they aim "to consider our system of production realistically as a technological process" (p. 15) and that they will set forth their "conclusions as to the nation's productive capacity on the basis merely of the technological considerations raised in this volume" (p. 21). Yet, they are troubled at numerous points in their statistical journey (perhaps, not sufficiently) over the fact that capacity is not independent of price; they attempt, as a rule, to make allowance for customs of seasonal operation, length of working-day,

etc., which often have little to do with technological considerations; and they devote a full chapter to the question of "whether the supply of gold and other forms of money and credit has been sufficient to meet productive requirements" (pp. 396–97).

The authors build up estimates of potential increase in national production from estimates of productive capacity for individual industries. Anyone at all familiar with this branch of statistics knows that the data cover only a slender portion of the industrial field, that much estimating is required to put them into comparable form, and that final results must needs be partly fact and partly figment. Hence considerable tolerance of bold estimating is both good manners and good sense. It is impossible, however, in the case of a fair number of the estimates reached in this volume—for example, the degree of "practical capacity" utilized in wool manufacture, silk and rayon manufacture, the full-fashioned hosiery industry, and the clothing industry—to discover just *what* to tolerate; for the process by which the estimates are reached is nowhere indicated. The authors say disarmingly: "Confessedly we have employed methods of estimating which, to many statisticians and economists, will seem daring if not hazardous" (p. 27). One example of how they proceed at times in constructing estimates may, perhaps, be worth citing.

To remedy the absence of data on the physical volume of capital utilized in agriculture, Dr. Nourse takes the following steps (in Appendix A): (1) The census of 1930 shows that nonresidence farm buildings constituted 45 per cent of the total value of farm buildings in that year. It is assumed that the corresponding percentage was 55 in 1900, 50 in 1910, and 47.5 in 1920. By applying these percentages to the reported values of all farm buildings, decennial estimates are made of the dollar value of nonresidence farm buildings. (2) These figures are deflated by an index of "all-commodity" prices. The actual deflators for each census date are ordinates of a straight-line trend fitted to averages of this price index for the ten years preceding each census date but used for the census date itself. Thus the deflator is 46.4 for 1900 and rises by increments of 19.7 points per decade. The deflated figures are described as "adjusted values of farm buildings—in millions of dollars." (It should be noted [*a*] that this arithmetic implies that farm buildings were priced considerably higher in 1930 than in 1920; [*b*] that the Department of Agriculture index of farm real estate values—which includes land as well as buildings—shows a drop of 32 per cent between 1920 and 1930; [*c*] that the so-called "adjusted

values" relate to dollars of the purchasing power of some undefined period.) (3) Next, the dollar values of live stock and of farm implements and machinery are deflated by special price indexes, with 1900 as base; that is to say, the deflating indexes are 100 for each of these two groups in 1900. (4) Finally, the dollar figures, adjusted for changes in price levels, as obtained in (2) and (3), are added together to give the total farm plant. Dr. Nourse's final totals, in "millions of dollars," for 1900, 1910, 1920, and 1930, run respectively 8,041, 8,888, 10,934, 10,203. (It should be noted that dollars of 1900 purchasing power are here added to dollars of the purchasing power of some other, but undefined, period. By adjusting the deflating indexes for buildings so that the index figure for 1900 is 100 instead of 46.4 and then proceeding as above, we get totals which run respectively 5,781, 6,330, 7,524, and 7,227. It should also be noted that the totals of agricultural capital take no account of improvements on land other than buildings.)

This example indicates that readers will need to exercise much caution in using the data and conclusions of *America's Capacity To Produce*. This is less true of some parts of the book than of others, as may be expected in a work of divided authorship. In particular, the chapters by Dr. Tryon on mineral industries and electric-power production present in a critical and scholarly manner the raw data and most of the elaborations practiced on them. They contain by far the best statistical work of the volume and constitute excellent surveys of the recent economic history of several of the mineral and related industries. Other chapters, too, contain a good deal of useful information. There is much to be gleaned from this volume about the course of capital investment in this country in recent years, and no economist—whatever his specialty—can afford to overlook it entirely.

ARTHUR F. BURNS

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L'évolution des besoins dans les classes ouvrières. By MAURICE HALBWACHS. Nouvelle Bibliothèque Économique. Paris: Librairie Félix Alcan, 1933. Pp. xii+163. Fr. 30.

Much of the data of family budgets does not lend itself to comparison, but in the discriminating hands of Professor Halbwachs certain of the data are made to yield illuminating conclusions regarding expenditure patterns, both within a social class and income group and among different classes and income groups at a given time, and also over a period of years.

Professor Halbwachs is concerned to find what information can be gained from budget studies on four major problems: (1) the proportional and total expenditures for the principal items in the family budget for the same class at different income levels, the subject matter of Engel's classic work; (2) the changes which occur in expenditure patterns at a given time in a given class as the size of the family and the real income vary; (3) typical differences in expenditure among different classes—laborers, clerks, and public employees; (4) changes in expenditure which take place within a given class over a period of time.

For answers to the first three questions, Professor Halbwachs draws upon the elaborate study recently made by the German Statistical Office, *Die Lebenshaltung von 2,000 Arbeiter-, Angestellten-und Beamtenhaushaltungen-Erhebungen von Wirtschaftsrechnungen im Deutschen Reichs, von Jahre 1927–1928* (2 vols., Berlin, 1932). The German data are most interesting for what they reveal as to the differences in expenditure patterns in various classes of the employed population. Professor Halbwachs shows that laborers as a class spend a larger proportion of a given income on food and a smaller proportion on rent than do members of the white-collar class with the same incomes. The latter spend a little more than laborers, but distinctly less than public employees, for clothing; and a little more than laborers, but less than public employees, for "other" items. Professor Halbwachs holds that these differences may in part be due to the nature of the work performed by the three classes, but that they are also the result of the influences of the social milieu, and especially modern methods of merchandising. The same shops serve all classes for food and clothing, thereby conditioning all consumers to uniform standards of tastes and habits. It is seldom, however, that a working-class family is found living in a neighborhood populated by clerical workers, and vice versa.

The fact that expenditure assumes different patterns as the size of the family varies does not need demonstration, but Professor Halbwachs adds to our knowledge detailed information as to how the economies, imposed by necessity, are achieved. The revelations are, indeed, astonishing. Working-class families having four children spend in absolute amounts 41 per cent less for food, measured by "personal unit," than similar families with no children, 37 per cent less for housing, and 55 per cent less for "other" expenses. As between classes and income groups, the comparisons based on size of family are no less astonishing.

The author attempts also to trace the evolution of expenditure over a period of time to show how consumption shifts in response to changes in the standard of living. Total consumption and consumption per head in Paris are traced for certain items over a period of seventy years. But the most useful data for showing how working-class families have responded to an increase in real income are found in the American studies made during the past thirty years. Between 1902 and 1930 the proportion of the family income spent for food by wage-earners declined, rent apparently was relatively inelastic, while the "free" income was devoted chiefly to clothing and "other" items. Of the latter, automobiles, radios, pianos, sewing machines—the familiar list of domestic, mechanical appliances—were the most favored objects of expenditure. More, also, was spent on health and insurance, and savings increased, especially subscriptions to Liberty Bonds. This trend is explained, in part, by the prestige value which attaches to mechanical inventions because of their newness. Possession of them gives the worker, to whom they had hitherto been denied, a sense of participation in the modern world. The older categories of expenditure, the elaboration of food and lodging—which form so important a part of the standard of living in upper-middle-class circles—are not appreciated because they have the appearance of familiarity, and the new consumers have not been initiated into the subtleties of the culture which gives them significance. The new inventions are more easily understood; they offer variety, change, excitement. Their possession is flattering because they carry the stamp of contemporary social approval.

In a short review one cannot do justice to the interest and variety of the material Professor Halbwachs has presented. It raises many questions for the statistician and the sociologist. The author is to be commended on the industry which has gone into the work, and to be complimented on the skill with which he has integrated so great an array of detail.

HELEN FISHER HOHMAN

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Pitfalls in the Statistical Construction of Demand and Supply Curves. By RAGNAR FRISCH. (Veröffentlichungen der Frankfurter Gesellschaft für Konjunkturforschung, Neue Folge, Heft 5.) Leipzig: Hans Buske, 1933. Pp. 39. RM. 3.60.

This study undertakes an examination of some of the mathematical assumptions and dangers involved in attempts to construct demand

and supply curves from statistical data. It deals briefly with the problem in general terms, but, "to make the discussion concrete" is largely devoted to an examination and criticism of the Leontief method of constructing such curves. It represents a careful, critical analysis from a mathematical standpoint of the general problems with which one must be concerned in appraising the meaning of attempts to construct supply and demand curves from statistical data. With regard to the Leontief method in particular, the study provides us with a penetrating theoretical and mathematical explanation of why that method is likely to give results which are of no significance.

After developing a set of fundamental equations Professor Frisch proceeds to classify the various possible cases with which one would have to deal in an actual problem, first, according to the varying degrees of correlation between the quantity and price data in the two parts (materials) into which the data must be divided to apply the Leontief method, and second, according to the comparative ratios of the amplitude of price and quantity fluctuations in the two parts. The author demonstrates that under certain combinations of these circumstances one root of the equation is determinate, under others both roots are determinate, and under still others both roots are either indeterminate or meaningless. It is pointed out that for the most part in those cases where the roots of the two equations are determinate the same results would be obtained by fitting ordinary regressions to the two parts of the price-quantity data.

Professor Frisch's conclusions may, perhaps, best be summed up in his own words.

> Thus the only situation in which there might be a meaning in using Leontief's method, is the case where all the following three conditions are fulfilled:
>
> 1. The relative (x,p) violence must be significantly different in the two materials on which the computations are built.
>
> 2. The (x,p) correlation must be significantly different in these two materials.
>
> 3. The shifts must be uncorrelated in both materials.
>
> In other words the appearance of the (x,p) distribution must be the one corresponding to case (8) in Table 1. And in addition to this we must be in a situation where there is a definite reason for assuming the shifts to be uncorrelated.
>
> Is there a great likelihood that we shall meet such a situation in practice? I think it is safe to say that it would be a veritable miracle if we should ever

find a material satisfying all these conditions and having nevertheless the same demand and supply elasticities. It would even be a miracle, I think, if the two observable criteria (1) and (2) should be satisfied.

With Professor Frisch's opinion that the first and second criteria would be satisfied only by a "miracle" I cannot agree. Both the (x, p) correlation and the (x, p) violence depend upon the relative degree of fluctuation of the supply and demand curves (assuming constant elasticity of the curves) and hence these two criteria are not independent. If one is fulfilled it is to be expected that the other will be.

Nevertheless, I do believe that it is only occasionally that all three of the criteria will be fulfilled. Because they are frequently subject to trends, because shifts of both demand and supply curves are affected by changes in the price level and by business fluctuations, and because of still other reasons it is likely that such shifts will be correlated.

In justice to Dr. Leontief, however, it should be noted that he clearly recognized that in any specific analysis it is necessary to determine the extent to which the assumptions of his method are met by the actual conditions.

There is danger that Professor Frisch's article will be considered as primarily an attack on the Leontief method, particularly in view of the fact that it supports the general conclusions arrived at by Henry Schultz in his discussion of Leontief's method.[1] If so this is in spite of the statement:

> Needless to say, these critical remarks have not been motivated by any special wish to reduce the value of Leontief's work as compared with the value of other works in this field. . . . . Leontief's work is here discussed only as a typical example in order to draw attention to a large and important group of pitfalls which, as I see it, have been nearly completely overlooked in the statistical works of recent years, particularly in the works that have been directed toward a numerical determination of the shape of various relationships of economic theory.

In the opinion of the reviewer, any method which is supposed to yield demand or supply curves by the application of a stereotyped procedure, especially if it uses only data as to prices and quantities of the commodity in question as its basic material, is subject to somewhat similar criticism. This applies to the methods of link relatives and trend ratios as well as to the Leontief method. In some cases the former

[1] "The Meaning of Statistical Demand Curves," written for *Veröffentlichungen der Frankfurter Gesellschaft für Konjunkturforschung*.

have the very great merit that they "eliminate" trends in the original data, but there are other instances where this is a disadvantage. The real merit of the methods developed by Moore and his followers lies in their adaptability. It is only in exceptional cases that good evidence as to the nature of demand can be had by using for basic data only the prices and quantities of a commodity. But multiple correlation methods provide us with tools of analysis which are extremely helpful in untangling the complex interrelationships between changes in prices, quantities, and the conditions of demand and of supply. Furthermore, they can be adapted to that interplay of induction and deduction which is so necessary to the analysis of the causal relationships of production, consumption, and price of any commodity.

Professor Frisch has done statisticians and economists a real service in pointing out from a mathematical standpoint some of the pitfalls which "lie on the road to statistical demand and supply curves." This type of critical examination of methods in general should be carried farther, but we also need critical examinations of actual analyses which have been made of individual commodities.

E. J. WORKING

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Prairie Settlement: The Geographical Setting. By W. A. MACKINTOSH. Vol. I, "Canadian Frontiers of Settlement," eds. W. A. MACKINTOSH and W. L. JOERG. Toronto: Macmillan Co. of Canada, Ltd., 1934. Pp. xv+242. $4.00.

Economic Problems of the Prairie Provinces. By W. A. MACKINTOSH assisted by A. B. CLARK, G. A. ELLIOTT, and W. W. SWANSON. Vol. IV, "Canadian Frontiers of Settlement," eds. W. A. MACKINTOSH and W. L. JOERG. Toronto: Macmillan Co. of Canada, Ltd., 1935. Pp. ix+308. $4.00.

The Canadian Pioneer Problems Committee, under the chairmanship of Professor W. A. Mackintosh and with the support of other Canadian scholars and of the Social Science Research Council, has been engaged over a period of years upon a program of research on "Canadian Frontiers of Settlement." The results are to be published in nine volumes, of which these two are of especial significance, since the chairman has been directly responsible for them. Dr. Bowman, who may be regarded as the father of the project, is amply justified in his statement in the Foreword that it "cannot fail to provide a fresh

starting-point for the consideration of a group of national questions that grow ever more important."

The program has been concerned primarily with the Prairie Provinces, and the first and introductory volume is concerned with the geographic forces which condition and control settlement. A general description of "Land and Climate" is followed by chapters on "Agricultural Exploration," "Railways and Settlement," "The Spread of Settlement," the various physiographic regions, "Climatic Variability," and "The Probable Limits of Settlement." Temperature, frost and rainfall, transportation and relationship to markets, fuel and construction materials, vegetation, soil composition and fertility, and the consequent distribution of crops and settlement, are discussed in detail. The text is supplemented with a wealth of admirable photographs, maps, charts, and tables, and a full appendix on soils prepared by Dr. J. D. Newton.

Volume IV analyzes the economic institutions and problems which have developed in relation to this geographic background. An introductory discussion of "Economic Trends" precedes a study of "Economic Fluctuations," which is concerned with the peculiarities of income and costs. This is followed by a close examination of the overhead costs and charges characteristic of the region, beginning with those involved in building up the transportation and marketing systems. Professors A. B. Clark and G. A. Elliott contribute chapters on "Provincial Finances" and "The Distribution of Financial Burdens and Services" for Alberta; and Professor W. W. Swanson discusses rural local government, taxation, and expenditure in Saskatchewan, and examines the problems which arise in sample municipalities of "pioneer," "established," and "retrograde" types in the same province in "normal" years, and in depression. The volume concludes with an important chapter on "Farm Credit." There is a statistical appendix and an appendix by Professor Elliott on the "Problems of a Retrograde Area in Alberta," and another by Professor H. C. Grant on "Taxation in Pioneer Areas in Manitoba."

From these detailed studies there emerges a well-defined thesis. The problem of pioneer communities is the combination of a violently fluctuating and uncertain income combined with heavy sunk costs and fixed charges. New territory has been opened up by immigrants from older societies who brought with them an advanced technique which has made possible the rapid exploitation of untouched resources. This process required capital which had also to be procured from established

economies in quantities sufficient to permit the development of transportation systems capable of opening up markets for the staple cash crop and to provide those governmental and social services, such as education and hospitals, which settlers with a high standard of life demand. This capital has ordinarily been obtained at the cost of the assumption of fixed charges, both by governmental authorities and by private settlers. Capital investment in transportation and "social overhead" imply heavy and rigid taxation. Interest charges and the farmer's costs of production tend to be inflexible. The income from which these charges and costs must be met and a living provided for the members of the community depends upon the crops produced and the prices obtained from their sale. Volume I describes the extreme variability of crop yields due to such factors as drought and frost, and Volume II supplements a discussion of crops and grades with an analysis of price changes.

> The wheat farmer in Western Canada is engaged in a business subject to unusually sharp fluctuations, imposed on it in greater or less degree by pronounced variations in rainfall and the other climatic conditions of wheat growing, and by the necessity of competing in a far distant world market for the sale of a raw material [I, 185].

The farmer's net income, the surplus (or deficit) left over when fixed expenses have been met, is subject to even more acute variations, which are measured by a "co-efficient of variation" ranging from 65 to 173 per cent in different districts for the period 1921 to 1929 (IV, 30). The problem cannot be solved without reference to "the wider problems of world markets for agricultural produce and for capital" (IV, ix), but the study emphasizes "the essential conflict . . . . between the pressure toward rapid growth which required the assumption of heavy fixed charges, and a highly variable farm income" (IV, 276). The basic prerequisite of any solution is

> the necessity of shaping instruments and institutions to conformity with the fundamentals of this region, rather than to apply blindly those adapted to the needs of other regions to the wholly different conditions of the Prairie Provinces [IV, 279].
>
> Agriculture in this region can never lose altogether its variable nature, and its economic institutions will tend in the future as in the past to turn to forms in which they can withstand the variations in income which they cannot avoid [I, 185].

The problem is basic, not merely in the Prairie Provinces, but throughout the whole Dominion, since the Canadian economy is built up on the production of wheat in the West and the production of other staple products elsewhere, and is therefore subject to the effects of the fluctuations in the income derived from them in relation to the heavy overhead charges they involve.

The inflexibility which is due to this situation is intensified by the geographic difficulties which hinder diversification of products to offset the collapse of wheat markets. In the Prairie Provinces

> reduction [in the production of wheat] will come in the Forest and Park Belts, where the comparative advantage of wheat has not been great, and to a less extent in the centre of the semi-arid belt, where the uses of land for grazing or for growing characteristic irrigation crops become more profitable. The greater part of the Prairie Plains, however—that part which now practices a high degree of specialisation in wheat—may be expected to maintain its production because of the absence of alternatives [I, 204].

If a greater variety of products is to be raised in these wheat districts it will and should be not for their own sake, but in order to increase the efficiency of wheat farming.

In the past the resilience of the economy has been largely dependent on the extent of the unused resources still available. Professor Mackintosh concludes that

> the history of settlement in Canada is not closed—though the volume and momentum of pre-war settlement may never be duplicated, the margin of settlement will continue to move into new areas [I, xv].

The dependence of this movement not only on geographic factors but also on economic conditions is the subject of a most informative analysis.

> Settlement of the Prairie Provinces falls clearly into the following great periods: the false start (1876–1882); a period of recession and severe struggle (1883–1895); the period of the great influx (1896–1913); the war and post-war years (1914–1920) when the influx of new settlers was reduced but the extension of settlement was pushed rapidly; the post-war slump (1921–1925); a new period of expansion (1926–1929). The physical factors of settlement were the same for all those periods. It was chiefly the economic factors which caused the great movements of advance and retreat and consolidation [IV, 3].

Under "normal" conditions we may expect a

> further increase in the area of land in farms, say 15 to 25 per cent, a less than proportionate increase in the production of wheat, and an increase in rural population which may soon be converted into a decline [I, 204].

Later studies by Professor W. B. Hurd confirm this suggestion that rural expansion will be unable to absorb the natural increase in the rural population.

When further studies have been carried out to supplement these results with an extended analysis of the peculiar part played in the relation of these fringe areas to their metropolitan centers by such factors as transport, taxation, and governmental action, we may hope to build up a complete picture of the whole problem of the provision of the necessary capital by private individualistic action, and by the assumption of communal responsibility. It would permit intensive discussion of the difficult problem of how the necessary overhead costs are met and how the burden of the risks inherent in their assumption is distributed between established and fringe areas, between private capitalists and taxpayers, between debtors and creditors. There is room for a more thorough interpretation in the light of the whole problem of the divergence of the incidence of costs and gains on the community and on the farm family, and on the railway company and bank, and the effectiveness (or limitations) of existing social and economic machinery in providing the necessary flexibility. The contribution made by frontier fringes, whether expanding or retrogressive, to the wealth of metropolitan centers calls for further study. Only when these things are fully understood can we see clearly the vital problem of the economy: How can the most be secured from the existing human, geographic, instrumental, and institutional overhead? How far is the social and economic machinery helpful or obstructive?

The experience of particular districts vividly illustrates the peculiar problem of pioneer economies, the problem of the relationship of outlying areas to the central established regions of dense settlement. The position of the "fringe" municipalities in Saskatchewan in relation to the established settlements is parallel to that of the Prairie Provinces in relation to the Canadian economy, and to that of the Canadian economy in relation to the more mature parts of the world economy.

I. M. Biss

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American Treasure and the Price Revolution in Spain, 1501–1650. By EARL J. HAMILTON. "Harvard Economic Studies, Vol. XLIII." Cambridge: Harvard University Press, 1934. Pp. xxxv+428. $4.50.

When Professor Hamilton's first study appeared as the first article in the first issue of the *Journal of Economic and Business History*, another dark spot in European economic history began to be illuminated by American scholarship. Four other studies followed in other journals, and these five instalments, revised and supplemented, form the core of the present book. The volume therefore lacks the freshness of a brand-new tale; but the new material, on money, inflation, weights, measures, sources of information, and group price movements, rounds out the story and indicates the herculean task that confronts any historian of prices. One can readily accept the assertion that 30,750 hours of work, 12,500 hours of assistance, and not less than 3,000,000 computations have gone into the making of this book. Over a hundred towns were visited; the manuscripts of municipalities, cathedrals, convents, charity hospitals, and government departments were combed; the raw material was then handled with great statistical skill, and embodied in thirty tables, twenty charts, and one hundred pages of appendixes.

From this sierra of searching emerge two clear quantitative results. In the first place, we now know as definitely as is humanly possible the size of the flow of gold and silver from America to Spain. We do not know how much was acquired or produced, or how much slipped quietly out of Spanish America to foreign countries or colonies. Professor Hamilton explodes the view that English, French, or Dutch marauders redistributed any great part of the treasure in the period under survey, and suggests that bullion crossing the Atlantic in a Spanish *flota* was as safe as in an armored truck in New York. He also minimizes the extent of smuggling of treasure; smuggling was fraught with danger and expense, and the leakage from the Spanish colonies to their neighbors probably became important only after 1650. Hence the traffic was comparatively leak-proof, and the figures of registered imports give a fairly satisfactory measure of the extent of the influx. That influx was a "mammoth stream," but its total volume was only a half to a tenth that estimated by earlier writers. Professor Hamilton does not modernize his amounts, but if I have translated his figures correctly the total gold imports from 1520 to 1660 were less than the annual out-

put of the Rand, and at most one-fortieth of the United States gold hoard of 1934. The silver imports were vastly greater (about eighteen thousand tons), large enough to upset the ancient and medieval bimetallic ratio of 10 to 1 and to establish a new rate of 15.5 to 1.

In the second place, the extent of the Spanish price revolution has now been carefully measured. In 1601 silver prices for the whole country were 4.32 times as high as in 1501. There were regional differences, for while prices in Andalusia had quintupled, those in Old Castile and Valencia had risen only three-and-a-half-fold. Even the nineteenth and twentieth centuries afford "no example of a hundred-year price upheaval in terms of a fixed-weight monetary unit comparable to that" of sixteenth-century Spain. Some attempt is made to compare the Spanish price story with that of other countries, but until the price researches now in hand yield their results no satisfactory comparison is possible.

The most difficult part of Professor Hamilton's work was the establishment of causal relations between treasure imports and price movements. The "extremely close correlation" between the increase in bullion imports and the advance of the price level throughout the sixteenth century "demonstrates beyond question that the 'abundant mines of America' were the principal cause of the Price Revolution in Spain" (p. 301). It is a pity that this statement was not elaborated. The chapter headed "Why Prices Rose" is chiefly devoted to criticism of contemporary explanations; but it does not really tell us how the treasure behaved in the country, how much of it stopped at home, how much passed out immediately to France, Antwerp, or other points, or what part it played in currency or credit affairs. This omission is not the author's fault, but is due to lack of material or of adequate studies of Spanish agriculture, industry, commerce, and finance. Till such studies are available the influence of the treasure and of nonmonetary factors cannot be described or estimated satisfactorily.

If the Spaniards will not give us those studies, Harvard must. Meanwhile Professor Hamilton promises to increase our already great debt to him by carrying his work back to 1350 and forward to 1800. That is good news, for he has set standards of industry, thoroughness, and lucidity that call for admiration and imitation. His book is one of the most important works of the last decade.

HERBERT HEATON

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Parità e preferenza doganale nel dopo guerra. By JACOPO MAZZEI; *Sull' imposta progressiva.* By LIONELLO ROSSI; *Contributo alla teoria economica del costo di produzione.* By RAFFAELLO LUPETTI. (Istituto Superiore di Scienze Economiche e Commerciali di Firenze.) Florence: Libreria Internazionale Seeber, 1933. Pp. viii+387. L. 35.

These three monographs reflect great credit, each in its own way, upon the institution sponsoring the series in which they appear.

The first monograph—that by Professor Mazzei, on "Tariff Equality and Tariff Preference in the Post-War Period"—forms a valuable supplement to the same author's earlier work, of which as yet only the first volume has been published, on *Differential Tariff Policy and the Most-Favored-Nation Clause* (*Politica doganale differenziale e clausola della nazione piu favorita;* Florence, 1930). Like all the writings of Professor Mazzei, the contribution under review is notable for the solidity of its learning and the modesty and sanity with which its conclusions are stated. It is a pity that Professor Mazzei's writings are not better known to economists in the English-speaking countries, particularly since a good part of his work has been concerned with the history of international trade-policy in certain of those countries. Worthy of special mention, in this connection, is his interesting and suggestive volume on *English International Economic Policy Before Adam Smith* (*Politica economica internazionale inglese prima di Adamo Smith;* Milan, 1924).

Much of the argument in the monograph by Lionello Rossi "On Progressive Taxation" is such that it will not be accepted without serious reservations by some readers. What is involved principally is the question—anything but a new one, surely—as to the limits which are properly to be set to the assumptions underlying so-called "utility analysis," when an attempt is made to apply that type of analysis to social problems such as the distribution of the tax burden. The interested reader would be well advised to consult the discussion growing out of Dr. Rossi's monograph, a discussion in which Professor Luigi Einaudi and Umberto Ricci took part, in *La Riforma Sociale* for September-October and November-December, 1933.

Dr. Raffaello Lupetti's "Contribution to the Economic Theory of Cost of Production" merits particular mention because of the light it throws upon the quality of the instruction in economics in Italian universities. The monograph in question was presented originally as a

dissertation for the "laurea" at the Institute sponsoring the publication under review. The "laurea," though it usually carries with it the degree of "doctor," is much more closely comparable, in terms of years of study required, with our bachelor's or master's degree than it is with our Ph.D., which is in many ways more strictly comparable with the Italian "libera docenza." It would be absurd to pretend that Dr. Lupetti's monograph breaks new paths or even that its analysis will command assent at all points. Yet one asks in how many universities in America our graduating students could acquit themselves as creditably as Dr. Lupetti has done, and one realizes that the tradition of high quality in instruction in economics is still a thing of which Italy may be justly proud.

ARTHUR W. MARGET

University of Minnesota

A Decade of Radio Advertising. By HERMAN STRECKER HETTINGER. Chicago: University of Chicago Press, 1933. Pp. xix+354. $3.00.

The first two chapters of this book should prove of special interest to all persons who seek a better understanding of radio broadcasting. In the first chapter the author presents a useful classification of the fundamental utilities afforded the listener. The first of these is the satisfaction of entertainment, the second that of useful information. Better understanding of these basic utilities will broaden our attitudes toward this social force and point to new commercial techniques. The discussion of the fundamental elements of music and the application of its structure to broadcasting techniques is interesting. The writer points out that as an individual hears more music, his taste progresses from the simpler to the more complex forms. It is unfortunate that recent developments in program structure were not at hand when this analysis was made. Recent seasons have seen, for instance, the commercial sponsorship of such organizations as the Philadelphia, Minneapolis, Ford, and General Motors symphony orchestras.

The second chapter contrasts broadcast with periodical advertising. Its summary of the psychological aspects of radio advertising contains several statements which are interesting hypotheses for further analysis. It is unfortunate that the author has not brought together more points of view on controversial subjects.

The remainder of the book is primarily statistical. It is based on the results of a questionnaire study of broadcasting practice as reported by

fifty-two station managers, supplemented by other data submitted by twenty-four other stations and statistics from previously published material. It contains a detailed description of the present broadcasting structure and current practice in broadcast advertising. The chapters on spot (local) broadcasting are particularly valuable.

This book is a real contribution to our limited knowledge in a rapidly changing field. The statistical aspects of the study necessarily suffer from this rapid change. One might question the value of some of the rather laborious compilations, such as those on the various types of programs, but they are here on record for those who wish specific information. Its limitations appear to be those which come from the subject treated, rather than from any weakness in the study itself.

LYNDON O. BROWN

Northwestern University

The Canadian Economy and Its Problems: Papers and Proceedings of Study Groups of Members of the Canadian Institute of International Affairs, 1933–34. Edited by H. A. INNIS and A. F. W. PLUMPTRE. Toronto: Canadian Institute of International Affairs, 1934. Pp. 356. $2.50.

This volume is composed of some nineteen papers by different individuals, each one dealing with a particular aspect of the Canadian economy. The book is divided into two parts: Part I, designated the "Canadian Economy and the Depression," and Part II, "Central Banking in Canada." Five appendixes contain further relevant material. Although the approach is that of recovery and reconstruction—especially in Part I—these matters are not discussed without an attempt at analyzing the nature of the Canadian economic set-up; and this analysis is the great merit of the volume.

Space does not permit discussion or even mention of all the papers included in this collection. In Part I some papers deal with specific industries and others with the more general characteristics of the Canadian economy. Possibly it is not incorrect to say that the general problem in mind is that of peculiar economic rigidities in some parts of the Canadian economy coupled with exceeding flexibility in others. The introduction by Professor Innis and the summary section by Professor K. W. Taylor are particularly valuable in this connection. Part II deals with various aspects of the banking and monetary problems and makes most useful analyses and suggestions; these are most

timely in view of the fact that the new central bank is just starting operations.

This volume represents what competent Canadians are thinking of their economic community, and as a result it is one of the most interesting and valuable books on Canadian economics which has recently been published. Doubtless time will show errors in some of the analyses and will reveal the need for further development of others, but for the present every person who is seriously interested in the economic problems of Canada should consult this excellent volume.

C. A. CURTIS

Queen's University

The Social Cost of Industrial Insurance. By MAURICE TAYLOR. New York: Alfred A. Knopf, 1933. Pp. xx+421+xviii. $3.25.

This book is written by a person who is thoroughly familiar with the technique and details of policies and contracts and company methods. The various aspects of industrial insurance are discussed with a wealth of pertinent detail. The author's analyses show that there has been a trend toward lessening and correcting certain evils against which informed opinion has been taking position. His specific recommendations and criticisms are worthy of careful study, and are presented after a careful review of all the pertinent evidence.

The social value of industrial life insurance is the main problem with which the book is concerned. Dr. Taylor approaches the question from the field of social work, in particular as an outgrowth of interest in the question of the amount spent on insurance by recipients of relief from the Jewish Family Welfare Association of Boston. His general conclusion, as expressed in his Preface, is that "the gross inadequacy of this protection and its exorbitant cost, social as well as financial, stamp the effort [to achieve a measure of security] as practically futile. . . . . Drastic modifications are necessary if the business is more nearly to approach the true social function of a system of insurance."

Notwithstanding this severely phrased conclusion, the analysis and the argument is maintained on a candid and fair basis and full attention is given to the point of view of the technical insurance man. The defects of industrial life insurance include the high proportion of lapses, the high cost of insurance, and the excessive costs of collection, in addition to a series of specific evils all of which are discussed in detail. The lapse ratio, though much lower than twenty years ago, is still in the neighborhood of two-fifths within three years.

The author's method of comparing the cost of industrial and ordinary insurance, in particular that based on surrender value, seems open to criticism. It is not very helpful to compute average yearly net "cost" of an ordinary life insurance policy of $1,000 after deducting cash surrender value after ten years at $0.13 per year (p. 184) as a basis for comparison with the average of $17.37 for industrial insurance: nor has the percentage, 13702, of excess cost of the latter any great significance. The difficulty arises from inclusion of the interest accumulations in the cash surrender value, while the similar interest factor applicable to the policy holders' payments is ignored. The author admits, and even stresses, the unsatisfactory basis of the comparison; yet, though the question is an involved one, it certainly seems as if a sounder basis of comparison might be worked out. For practical purposes, of course, the comparison presented is striking and shows the heavy disadvantages of the industrial life policy.

The subject of life insurance in dependent families is of special interest in these times of depression. The problem of whether relief payments should be paid to maintain industrial insurance is one which has to be faced by social agencies. The chapter on health and welfare work in insurance companies gives a valuable survey of the development of this service. Alternative plans, short of compulsory government provision, have not proved particularly successful when measured against the need for security in the wage-earning classes.

The book is a mine of information on the whole subject of industrial life insurance.

ROBERT M. WOODBURY

Washington, D.C.

America's Social Morality: Dilemmas of the Changing Mores. By JAMES HAYDEN TUFTS. New York: Henry Holt & Co., 1933. Pp. x+376. $3.00.

Professor Tufts aims not at assessment of the success America has attained in conforming to moral codes but rather at survey and analysis of the ideals of life and norms of conduct embodied in law and public opinion. In particular, he wishes to describe areas of change and conflict in mores, the present dilemmas of public opinion, and to interpret change and conflict by means of analysis of the causes, forces, and traditions leading to conflicts of standards. Needless to say, analysis does not disclose any simple opposition between the righteous and

the wicked, liberals and conservatives, or capitalists and proletarians. Present problems involve a multitude of factors: attitudes and beliefs formed during preceding centuries, conflicts of interest between groups and races, differences in cultural backgrounds, differences of custom and interest between city and country, maladjustments resulting from the growth of cities and the growth of industry, and many other factors. Professor Tufts notes certain tendencies toward compromise or adjustment, and occasionally indicates the direction he thinks future adjustment will take; but for many moral conflicts he sees no promising adjustment; and certainly he presents no general formula for resolving current dilemmas.

Among the conflicts of attitudes and beliefs discussed are conflicts in regard to class and race, conflicting demands in connection with sex and marriage, oppositions of interest and belief in regard to property, business and industry, conflicts in regard to government, law enforcement, and crime, dilemmas in connection with gambling, intoxicants, and prostitution.

CHARNER M. PERRY

University of Chicago

The Economic Independence of Poland: A Study in Trade Adjustments to Political Objectives. By PAUL F. DOUGLASS. Cincinnati: The Ruter Press, 1934. Pp. 134. $2.00.

Before the World War the economic relations of the constituent parts of present-day Poland were largely with the three countries with which they had been joined for more than a century. This book deals with the economic adjustments made necessary by the creation of an independent Poland and by the policies of the new Polish state. The ninety-three tables which support the discussion are poorly arranged and not easy for the reader to follow. The Index is inadequate.

The author challenges several of the Polish trade policies, notably the attempt to develop a north-south transit trade and to build up a great overseas commerce through Gdynia and Danzig; the subsidization of exports; and the extensive program of industrialization. He minimizes both the achievements and the future possibilities of Poland's program for a sea-borne foreign trade, and states that "the direction of the flow of Polish commerce through the Baltic ports instead of across neighboring boundaries is a chart of the coercion of economic life to follow nationalist ambition" (p. 130). He points out that there

are two conflicting views in Poland as to objectives in economic development: one which was dominant from 1926 to 1929, "that Poland should be made economically independent through the development of industry" (p. 48); and the view which he believes is gaining ground in Poland and which he supports, that the country should pursue a more modest program of industrialization and attempt to develop agricultural and raw material exports. This second policy, as Mr. Douglass sees it (pp. 55, 91, 92, 126, 127, 130), is the one Poland should follow to achieve economic independence—a phrase which he uses throughout the book, not in the popular sense of economic isolation, but as meaning an economic development that will permit the best use of the country's resources.

The argument that trade with Poland's neighbors is particularly desirable because in this trade Polish exports exceed imports (p. 128) involves an ancient fallacy but the general approach of the book is in refreshing contrast to present-day doctrines of economic isolation.

FRANK WHITSON FETTER

Haverford College

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